

FINAL REPORT
JUNE 1996

REPORT NO. 96-17

PA116 CONTAINERS ON A
POLYETHYLENE PALLET
PRODUCED BY ALKET INDUSTRIES
MIL-STD-1660 TESTS

19961108 003

Prepared for:
U.S. Army Armament Research, Development
and Engineering Center
ATTN: AMSTA-AR-ESK
Rock Island, IL 61299-7300

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VALIDATION ENGINEERING DIVISION
SAVANNA, ILLINOIS 61074-9639

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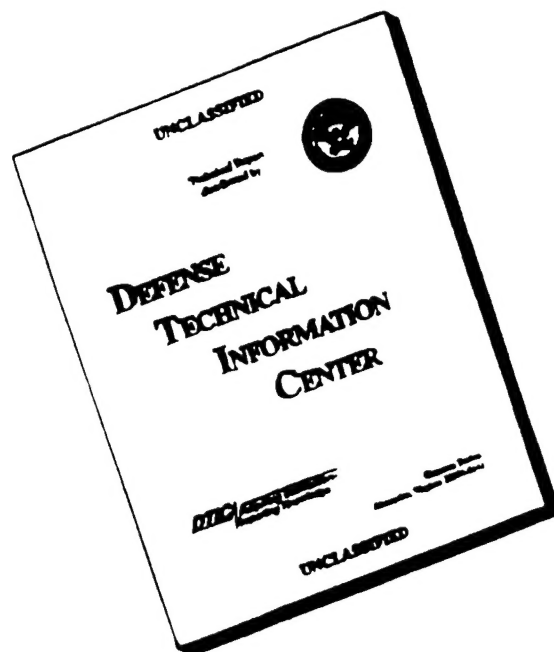
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REPORT DOCUMENTATION PAGE				Form Approved OMB No. 0704-0188	
1a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED			1b. RESTRICTIVE MARKINGS		
2a. SECURITY CLASSIFICATION AUTHORITY			UNLIMITED		
2b. DECLASSIFICATION / DOWNGRADING SCHEDULE					
4. PERFORMING ORGANIZATION REPORT NUMBER(S) 96-17			5. MONITORING ORGANIZATION REPORT NUMBER(S)		
6a. NAME OF PERFORMING ORGANIZATION U.S. Army Defense Ammunition Center and School		6b. OFFICE SYMBOL (if applicable) SIOAC-DEV	7a. NAME OF MONITORING ORGANIZATION		
6c. ADDRESS (City, State, and ZIP Code) ATTN: SIOAC-DEV Savanna, IL 61074-9639			7b. ADDRESS (City, State, and ZIP Code)		
8a. NAME OF FUNDING / SPONSORING ORGANIZATION U.S. Army Armament Research, Development and Engineering Center		8b. OFFICE SYMBOL (if applicable) AMSTA-AR-ESK	9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER		
8c. ADDRESS (City, State, and ZIP Code) ATTN: AMSTA-AR-ESK Rock Island, IL 61299-7300			10. SOURCE OF FUNDING NUMBERS		
			PROGRAM ELEMENT NO.	PROJECT NO.	TASK NO.
					WORK UNIT ACCESSION NO.
11. TITLE (Include Security Classification) PA116 Containers on a Polyethylene Pallet Produced by Alket Industries MIL-STD-1660 Tests					
12. PERSONAL AUTHOR(S) Bradley J. Haas					
13a. TYPE OF REPORT Final		13b. TIME COVERED FROM _____ TO _____		14. DATE OF REPORT (Year, Month, Day) 1996 June	
15. PAGE COUNT					
16. SUPPLEMENTARY NOTATION					
17. COSATI CODES			18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)		
FIELD	GROUP	SUB-GROUP			
19. ABSTRACT (Continue on reverse if necessary and identify by block number) The U.S. Army Defense Ammunition Center and School (USADACS), Validation Engineering Division (SIOAC-DEV), was tasked by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct MIL-STD-1660 tests on PA116 containers unitized on a high-density polyethylene pallet produced by Alket Industries, Kalona, IA. This report contains test results with the polyethylene pallet meeting MIL-STD-1660, Design Criteria for Ammunition Unit Loads, requirements.					
20. DISTRIBUTION / AVAILABILITY OF ABSTRACT <input checked="" type="checkbox"/> UNCLASSIFIED/UNLIMITED <input type="checkbox"/> SAME AS RPT. <input type="checkbox"/> DTIC USERS			21. ABSTRACT SECURITY CLASSIFICATION UNCLASSIFIED		
22a. NAME OF RESPONSIBLE INDIVIDUAL JEROME H. KROHN			22b. TELEPHONE (Include Area Code) 815-273-8929		22c. OFFICE SYMBOL SIOAC-DEV

U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL
VALIDATION ENGINEERING DIVISION
SAVANNA, IL 61074-9639

REPORT NO. 96-17

PA116 CONTAINERS ON A POLYETHYLENE PALLET PRODUCED BY
ALKET INDUSTRIES MIL-STD-1660 TESTS

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PART 1

INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USADACS), Validation Engineering Division (SIOAC-DEV), was tasked by the U.S. Army Armament Research, Development and Engineering Center (ARDEC) to conduct MIL-STD-1660 tests on a high-density polyethylene pallet produced by Alket Industries, Kalona, IA. The pallet is designed to carry a total of 30 PA116 containers with no bottom adapter.

B. AUTHORITY. This test was conducted IAW mission responsibilities delegated by the U.S. Army Armament, Munitions and Chemical Command (AMCCOM), Rock Island, IL.

C. OBJECTIVE. The objective of these tests was to ascertain whether a prototype, high-density polyethylene pallet constructed by Alket Industries was capable of meeting MIL-STD-1660, Design Criteria for Ammunition Unit Loads, requirements.

D. CONCLUSION. The palletized unit load completed testing with no damage occurring to the palletized unit load. Minor curvature of the pallet occurred. The palletized unit load passed MIL-STD-1660 requirements.

PART 2

5 AND 13 FEBRUARY; 1 AND 15 MARCH; AND 24 APRIL 1996

ATTENDEES

Bradley J. Haas
Mechanical Engineer
DSN 585-8336
815-273-8336

Cloyce Palmer
319-656-5100

Director
U.S. Army Defense Ammunition Center
and School
ATTN: SIOAC-DEV
Savanna, IL 61074-9639

Alket Industries
2148 Highway 22 West
Kalona, IA 52246

PART 3

TEST PROCEDURES

The test procedures outlined in this section were extracted from MIL-STD-1660, Design Criteria for Ammunition Unit Loads, 8 April 1977. This standard identifies nine steps that a unitized load must undergo if it is to be considered acceptable. The five tests that were conducted on the test pallets are summarized below.

A. STACKING TESTS. The unit load was loaded to simulate a stack of identical unit loads stacked 16 feet high, for a period of one hour. This stacking load was simulated by subjecting the unit load to a compression weight equal to an equivalent 16-foot stacking height. The compression load was calculated in the following manner. The unit load weight was divided by the unit load height in inches and multiplied by 192. The resulting number was the equivalent compressive force of a 16-foot-high load.

B. REPETITIVE SHOCK TEST. The repetitive shock test was conducted IAW Method 5019, Federal Standard 101. The test procedure is as follows: The test specimen was placed on, but not fastened to, the platform. With the specimen in one position, the platform was vibrated at 1/2-inch amplitude (1-inch double amplitude) starting at a frequency of approximately 3 cycles per second. The frequency was steadily increased until the package left the platform. The resonant frequency was achieved when a 1/16-inch-thick feeler gage momentarily slid freely between every point on the specimen in contact with the platform at some instance during the cycle or a platform acceleration achieved 1 ± 0.1 Gs. Midway into the testing period, the specimen was rotated 90 degrees and the test continued for the duration. Unless failure occurred, the total time of vibration was two hours if the specimen was tested in one position and three hours for more than one position.

C. EDGEWISE ROTATIONAL DROP TEST. This test was conducted using the procedures of Method 5008, Federal Standard 101. The procedure for the edgewise rotational drop test is as follows: The specimen was placed on its skids with one end of the pallet supported on a beam 4-1/2 inches high. The height of the beam was increased if necessary to ensure that there was no support for the skids between the ends of the pallet when dropping took place, but was not high enough to cause the pallet to slide on the supports when the dropped end was raised for the drops. The unsupported end of the pallet was then raised and allowed to fall freely to the concrete, pavement, or similar underlying surface from a prescribed height. Unless otherwise specified, the height of drop for level A protection conforms to the following tabulation:

GROSS WEIGHT (WITHIN RANGE LIMITS) (Pounds)	DIMENSIONS OF ANY EDGE, HEIGHT OR WIDTH (WITHIN RANGE LIMITS) (Inches)	HEIGHT OF DROPS ON EDGES	
		Level A (Inches)	Level B (Inches)
150 - 250	60 - 66	36	27
250 - 400	66 - 72	32	24
400 - 600	72 - 80	28	21
600 - 1000	80 - 95	24	18
1000 - 1500	95 - 114	20	16
1500 - 2000	114 - 144	17	14
2000 - 3000	Above 145 - No limit	15	12
Above - 3000		12	9

D. **INCLINE-IMPACT TEST.** This test was conducted by using the procedure of Method 5023, incline-impact test of Federal Standard 101. The procedure for the Incline-Impact Test is as follows: The specimen was placed on the carriage with the surface or edge which is to be impacted projecting at least 2 inches beyond the front end of the carriage. The carriage was brought to a predetermined position on the incline and released. If it is desired to concentrate the impact on any particular position on the container, a 4- by 4-inch timber was attached to the bumper in the desired position before the test. No part of the timber was struck by the carriage. The position of the container on the carriage and the sequence in which surfaces and edges are subjected to impacts was at the option of the testing activity and depends upon the objective of the tests. This test is to determine satisfactory requirements for a container or pack, and, unless otherwise specified, the specimen was subjected to one impact on each surface that has each dimension less than 9.5 feet. Unless otherwise specified, the velocity at time of impact was 7 feet per second.

E. **SLING COMPATIBILITY TEST.** Unit loads utilizing special design or non-standard pallets were lifted, swung, lowered and otherwise handled as necessary, using slings of the types normally used for handling the unit loads under consideration. Slings were easily attached and removed. Danger of slippage or disengagement when the load is suspended was cause for rejection of the unit load.

PART 4

TEST EQUIPMENT

A. PA116 Containers on Polyethylene Pallet with Metal Top Adapter (Test Sample No. 1).

- | | |
|--------------------|---------------|
| 1. Drawing Number: | 19-48-4079/7B |
| 2. Width: | 40 inches |
| 3. Length: | 44-1/2 inches |
| 4. Height: | 52-5/8 inches |
| 5. Weight Loaded: | 2,590 pounds |

B. PA116 Containers on Polyethylene Pallet with Metal Top Adapter (Test Sample No. 2).

- | | |
|--------------------|---------------|
| 1. Drawing Number: | 19-48-4079/7B |
| 2. Width: | 40 inches |
| 3. Length: | 44-1/2 inches |
| 4. Height: | 52-5/8 inches |
| 5. Weight Loaded: | 2,590 pounds |

C. PA116 Containers on Polyethylene Pallet with Metal Top Adapter (Test Sample No. 3).

- | | |
|--------------------|---------------|
| 1. Drawing Number: | 19-48-4079/7B |
| 2. Width: | 40 inches |
| 3. Length: | 44-1/2 inches |
| 4. Height: | 52-5/8 inches |
| 5. Weight Loaded: | 2,610 pounds |

D. PA116 Containers on Polyethylene Pallet with Metal Top Adapter (Test Sample No. 4).

- | | |
|--------------------|---------------|
| 1. Drawing Number: | 19-48-4079/7B |
| 2. Width: | 40 inches |
| 3. Length: | 44-1/2 inches |
| 4. Height: | 52-5/8 inches |
| 5. Weight Loaded: | 2,760 pounds |

E. Compression Tester.

- | | |
|-----------------------|----------------------|
| 1. Manufacturer: | Ormond Manufacturing |
| 2. Platform: | 60- by 60-inches |
| 3. Compression Limit: | 50,000 pounds |
| 4. Tension Limit: | 50,000 pounds |

F. Transportation Simulator.

- | | |
|------------------|--------------------|
| 1. Manufacturer: | Gaynes Laboratory |
| 2. Capacity: | 6,000-pound pallet |
| 3. Displacement: | 1/2-inch amplitude |
| 4. Speed: | 50 to 400 rpm |
| 5. Platform: | 5- by 8-foot |

G. Incline Plane.

- | | |
|------------------|--------------------|
| 1. Manufacturer: | Conbur Incline |
| 2. Type: | Impact Tester |
| 3. Grade: | 10 percent incline |
| 4. Length: | 12-foot |

PART 5

TEST RESULTS

TEST OBSERVATIONS. Each pallet load was constructed IAW 1948 Series Drawing No. 19-48-4079/7B. The deck dunnage plywood of each pallet was replaced with four polyethylene strips. Each test sample also has steel strips attached to the bottom of each polyethylene skid.

TEST SAMPLE NO. 1.

A. TEST OBSERVATIONS. Banding the pallet caused the outside skids to curl upward. A gap was created under the outside skids, allowing the palletized unit load to rock. The palletized unit load was considered unstackable.

B. STACKING TEST. The test sample was initially loaded to 9,000 pounds compression. The compression was released after one hour. No damage was noted during this test.

C. REPETITIVE SHOCK TEST. The duration of the test was 90 minutes for each orientation of the pallet. The transportation simulator was operated at 150 rpm while the pallet was oriented in the lateral direction. For the longitudinal orientation, the transportation simulator was operated at 130 rpm. After 3 minutes, the center skid was no longer attached to the pallet. The curved shape of the pallet as a result of banding caused the majority of the pallet weight to ride on the center skid. The fasteners attaching the center skid to the posts sheared off.

D. END OF TEST INSPECTION. No further damage occurred to the components of the palletized unit load.

TEST SAMPLE NO. 2.

A. TEST OBSERVATIONS. Additional screws were used to fasten the skids to the posts.

Banding the pallet caused the outside skids to curl upward. A gap was created under the outside skids, allowing the palletized unit load to rock. The palletized unit load was considered unstackable. The banding also caused a deformation in the outside deckboards at the location the straps crossed over them.

B. STACKING TEST. The test sample was initially loaded to 10,000 pounds compression. The compression was released after one hour. No damage was noted during this test.

C. REPETITIVE SHOCK TEST. The duration of the test was 90 minutes for each orientation of the pallet. The transportation simulator was operated at 208 rpm while the pallet was oriented in the lateral direction. For the longitudinal orientation, the transportation simulator was operated at 152 rpm. A corner of the pallet was melted due to contact with the vibration table.

D. EDGEWISE ROTATIONAL DROP TEST. Each side of the pallet was placed on a beam displacing it 4-1/2 inches above the floor. The opposite end of the pallet was raised to a height of 18 inches, then dropped. The first longitudinal drop caused the top adaptor to slide 5 inches in relation to the top row of containers. The top adapter returned to its original position when the unit load was lifted. The bands had loosened slightly. The first lateral drop caused the pallet to curve further and the straps to become looser. Movement of the unit load by toplift again allowed the top adapter to slide. Following the second longitudinal drop, the top adapter slid easily when the pallet was lifted. The second lateral drop caused the top row of containers to become unnested.

E. END OF TEST INSPECTION. No further damage occurred to the components of the palletized unit load.

TEST SAMPLE NO. 3.

A. TEST OBSERVATIONS. A 3/16-inch steel strip was fastened to the side of the deck to prevent the banding from causing deformation of the outside deckboards. A 1/4-inch steel strip was placed along the inside of the stringer boards to add structure.

B. STACKING TEST. The test sample was initially loaded to 10,000 pounds compression. The compression was released after one hour. No damage was noted during this test.

C. REPETITIVE SHOCK TEST. The duration of the test was 90 minutes for each orientation of the pallet. The transportation simulator was operated at 180 rpm while the pallet was oriented in the lateral direction. For the longitudinal orientation, the transportation simulator was operated at 170 rpm. No damage was noted.

D. EDGEWISE ROTATIONAL DROP TEST. Each side of the pallet was placed on a beam displacing it 4-1/2 inches above the floor. The opposite end of the pallet was raised to a height of 18 inches, then dropped. The lateral drops caused the pallet to take a curved shape. The 1/4-inch steel strips along the stringer boards bent and 5 of the screws fastening the strip to the stringer board were sheared off. With two skids resting on the floor, the third skid was raised 3 inches off the floor. The palletized unit load was no longer stackable.

E. END OF TEST INSPECTION. No further damage occurred to the components of the palletized unit load.

TEST SAMPLE NO. 4.

A. TEST OBSERVATIONS. The test sample was constructed IAW the drawing in Part 7. The pallet had angle iron placed along the stringer boards and steel strips along the outside deckboards. Two steel bridge assemblies were also added to the pallet for rigidity. After banding, one skid was raised approximately 1/16-inch while the other two skids rested on the floor.

B. STACKING TEST. The test sample was initially loaded to 11,000 pounds compression. While under compression, all three skids rested on the surface. The compression was released after one hour. No damage was noted during this test.

C. REPETITIVE SHOCK TEST. The duration of the test was 90 minutes for each orientation of the pallet. The transportation simulator was operated at 130 rpm while the pallet was oriented in the longitudinal direction. Following this orientation, the palletized unit load rested on all three skids. For the lateral orientation, the transportation simulator was operated at 130 rpm. The spacing between the third skid and the floor following the vibration was approximately 1/32-inch. No damage was noted.

D. EDGEWISE ROTATIONAL DROP TEST. Each side of the pallet was placed on a beam displacing it 4-1/2 inches above the floor. The opposite end of the pallet was raised to a height of 18 inches, then dropped. The first drop caused a band to break. The band broke at the location the strap runs over the angle iron with a sharp corner which was not properly ground smooth. The strap was replaced and the remaining drops were performed. Following all drops, a space of approximately 1/16-inch existed between the third skid and the floor when the other two skids were resting on the floor. No damage occurred to the palletized unit load.

E. INCLINE-IMPACT TEST. The incline plane was set to allow the pallets to travel 8 feet prior to impacting a stationary wall. The pallet was rotated clockwise after each impact, until all four sides had been tested. No damage resulted from any of the four impacts.

F. SLING COMPATIBILITY TEST. The palletized unit load was lifted by the top adapter using 4 slings, 3 slings, 2 slings diagonal from each other, 2 slings on the same side, 2 slings on the same end, and 1 sling. The third skid was raised approximately 1/8-inch when the other two skids were on the floor. No damage resulted to the palletized unit load.

G. END OF TEST INSPECTION. No further damage occurred to the components of the palletized unit load.

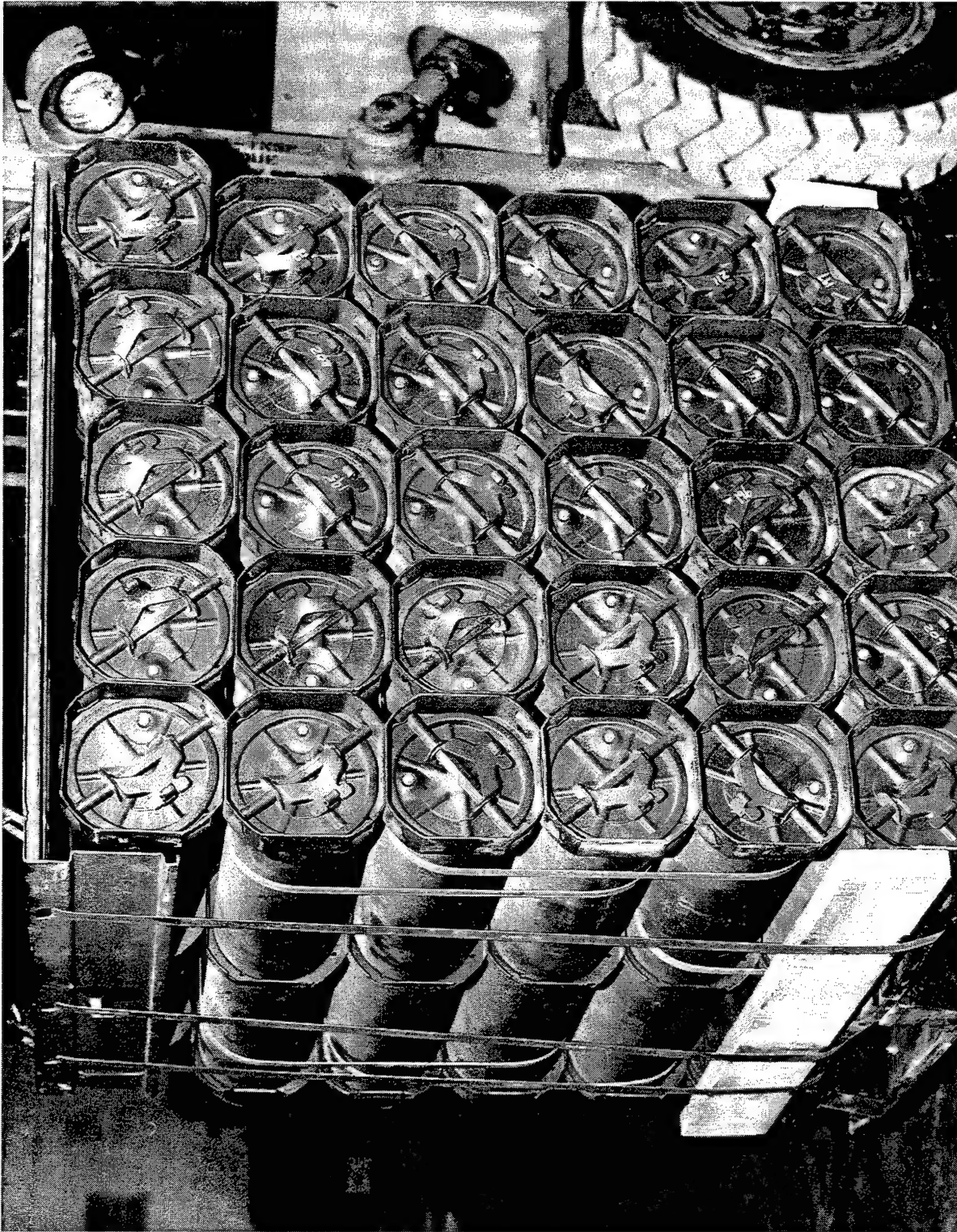
PART 6

PHOTOGRAPHS



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -
SAVANNA, IL

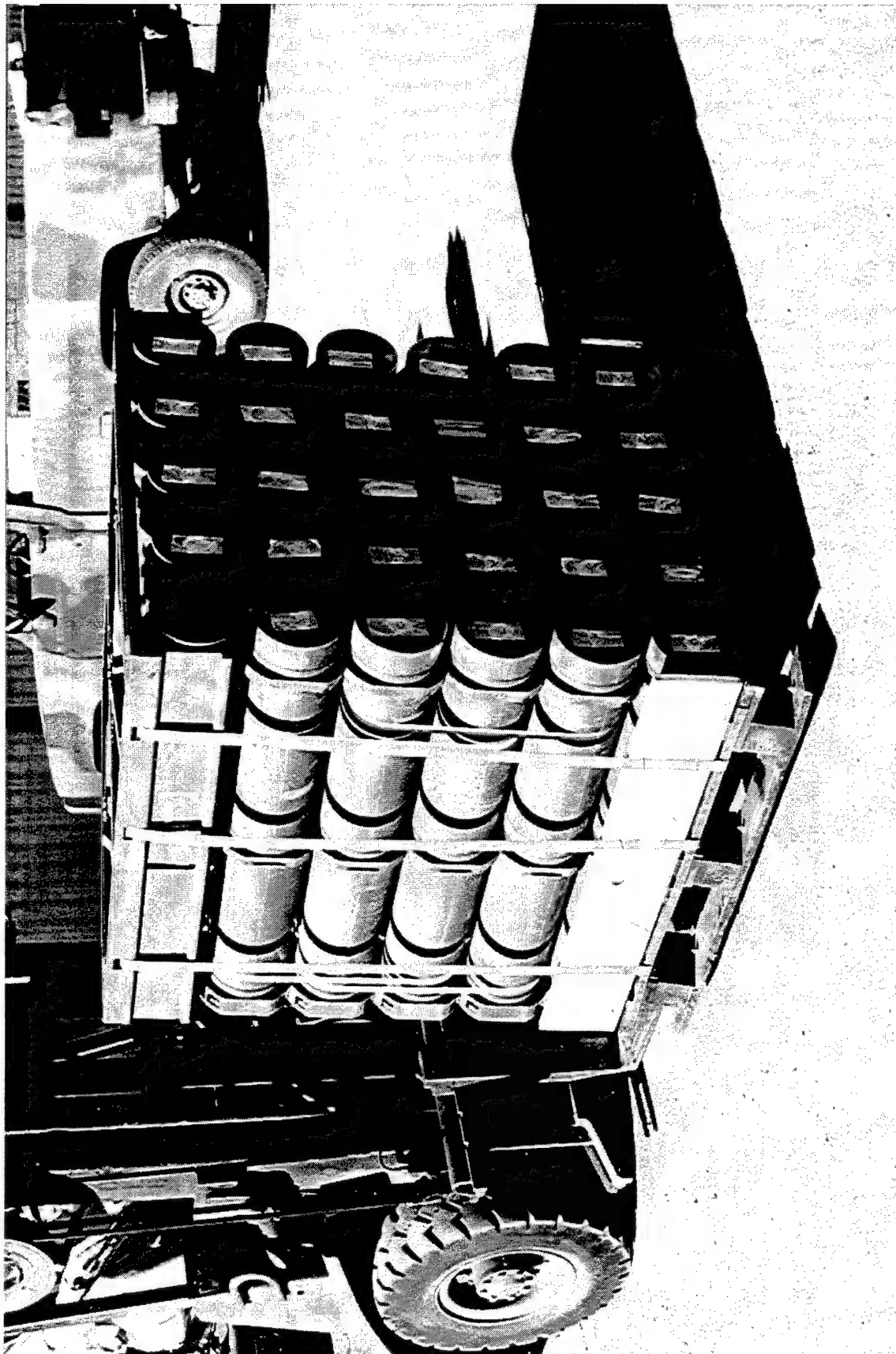
PHOTO NO. AO317-SCN96-81-1523. This photo shows the curvature of pallet no. 2 following the drop test. Deformation of the outside deckboard due to strapping tension can also be seen in this photo. Note the melted corner of the pallet that occurred during the vibration test.



	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
PHOTO NO. AO317-SCN96-81-1521. This photo shows the gap that existed between the top row of containers and the top adapter of test sample no. 2. The gap is a result of the pallet not remaining flat.		

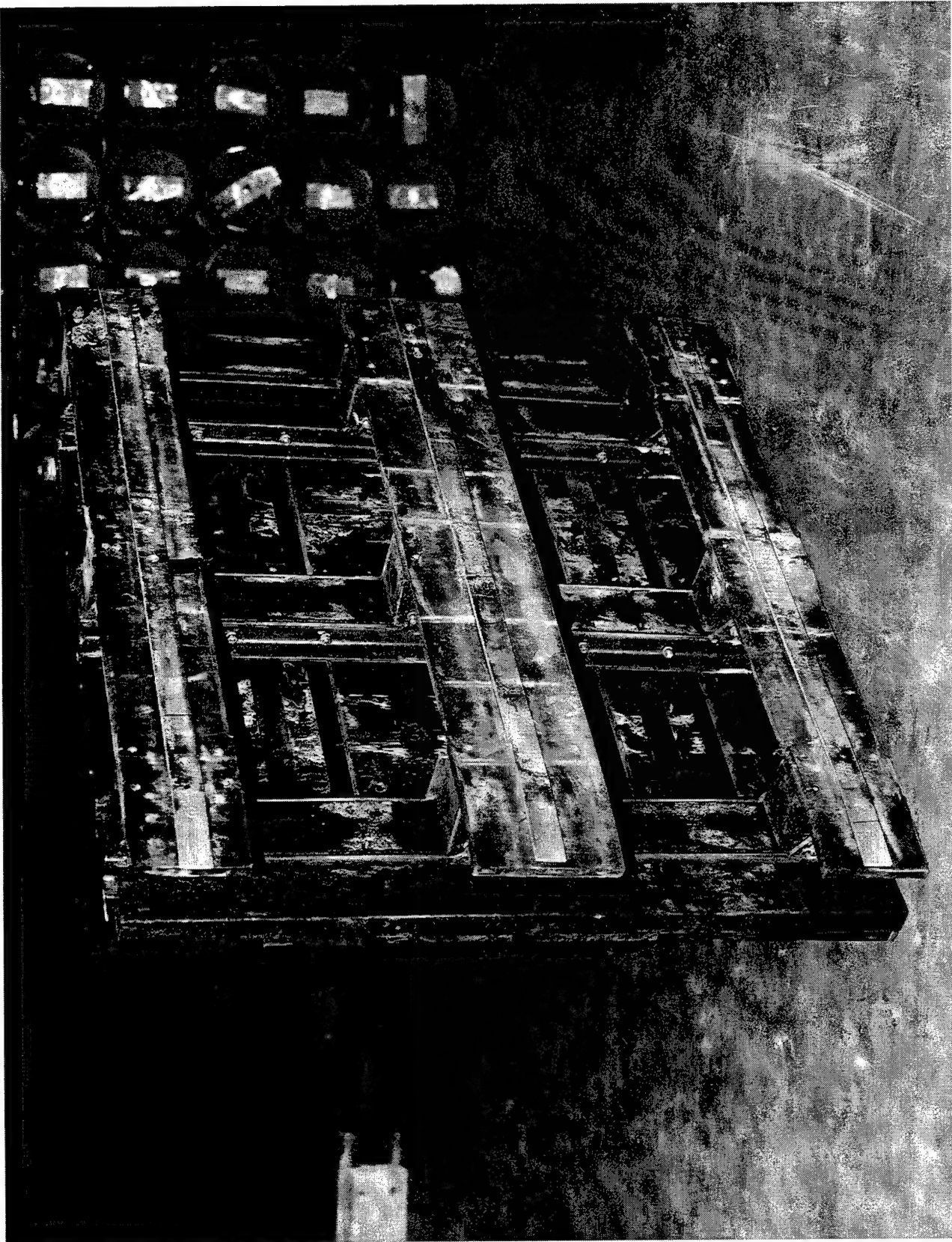


	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
PHOTO NO. USADACS-DEV-96-17-01. This photo shows the metal strips attached to the stringer boards and the bottom deckboards of test sample no. 3.		



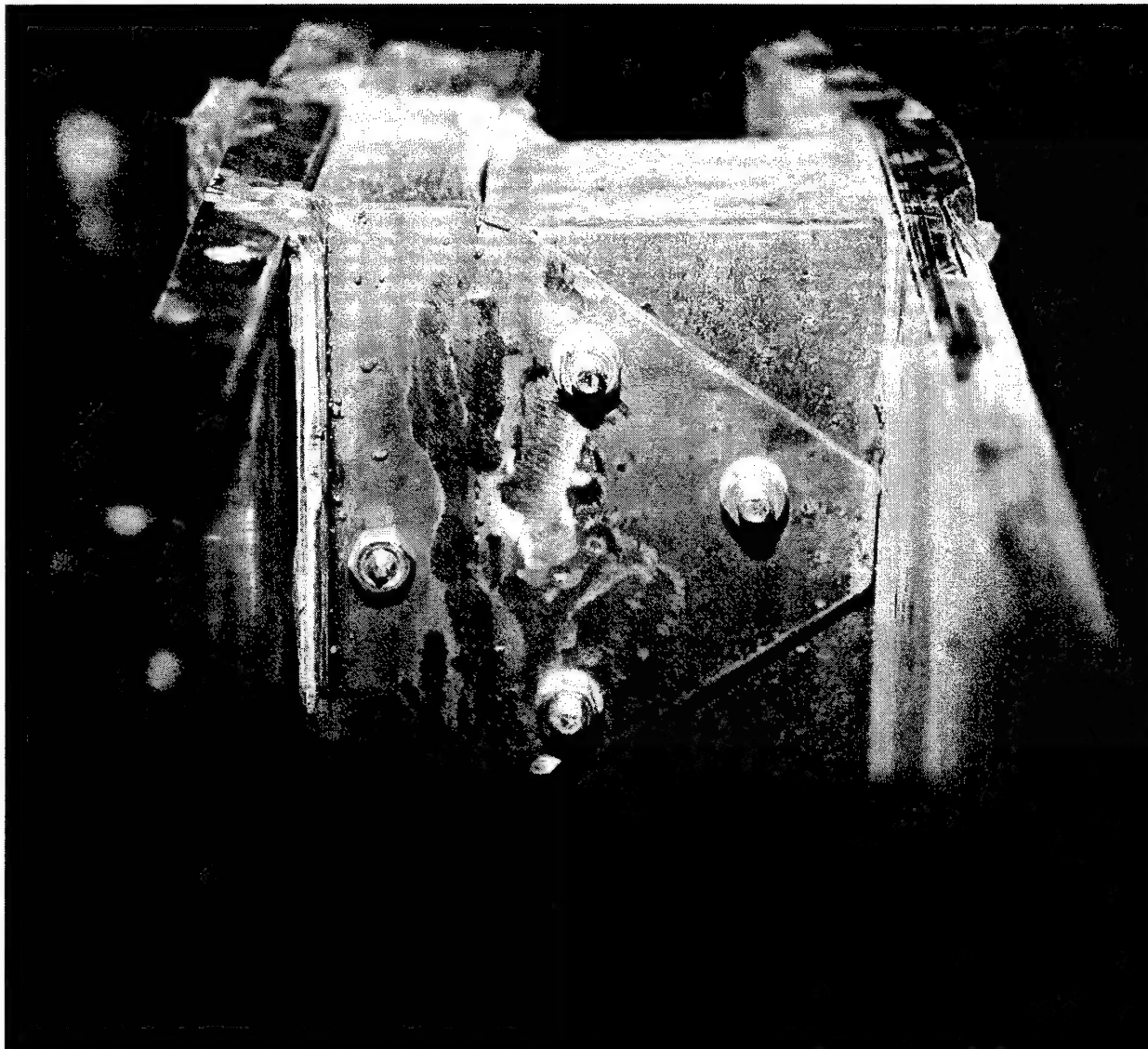
U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -
SAVANNA, IL

PHOTO NO. USADACS-DEV-96-17-02. This photo shows the curvature of pallet no. 3 following testing. A gap resulted between the top row of containers and the top adapter. The metal strip along the deck is also shown in this photo.

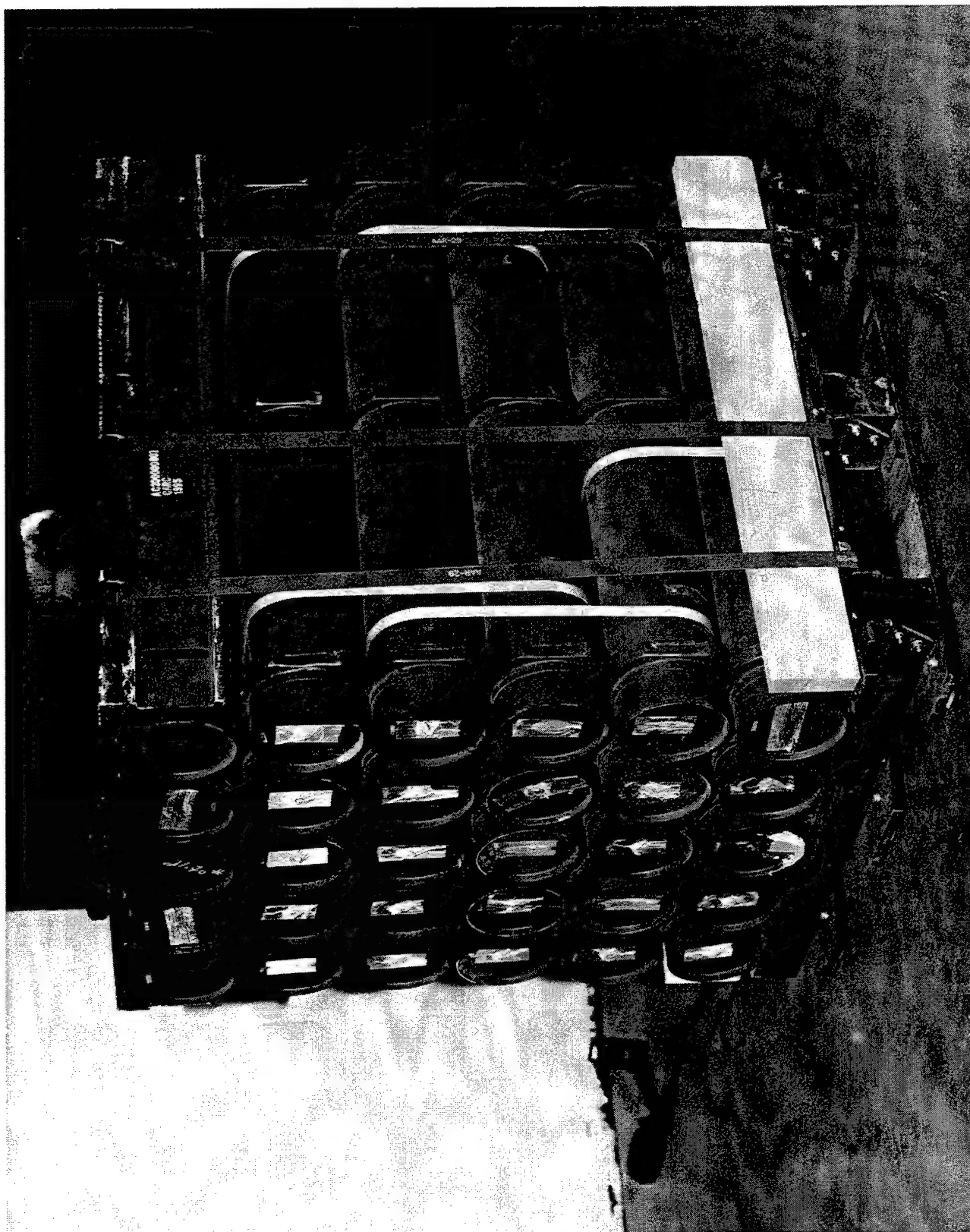


U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -
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AO317-SCN96-140-2697. This photo shows the bottom of test sample no. 4. Note the steel added for rigidity.

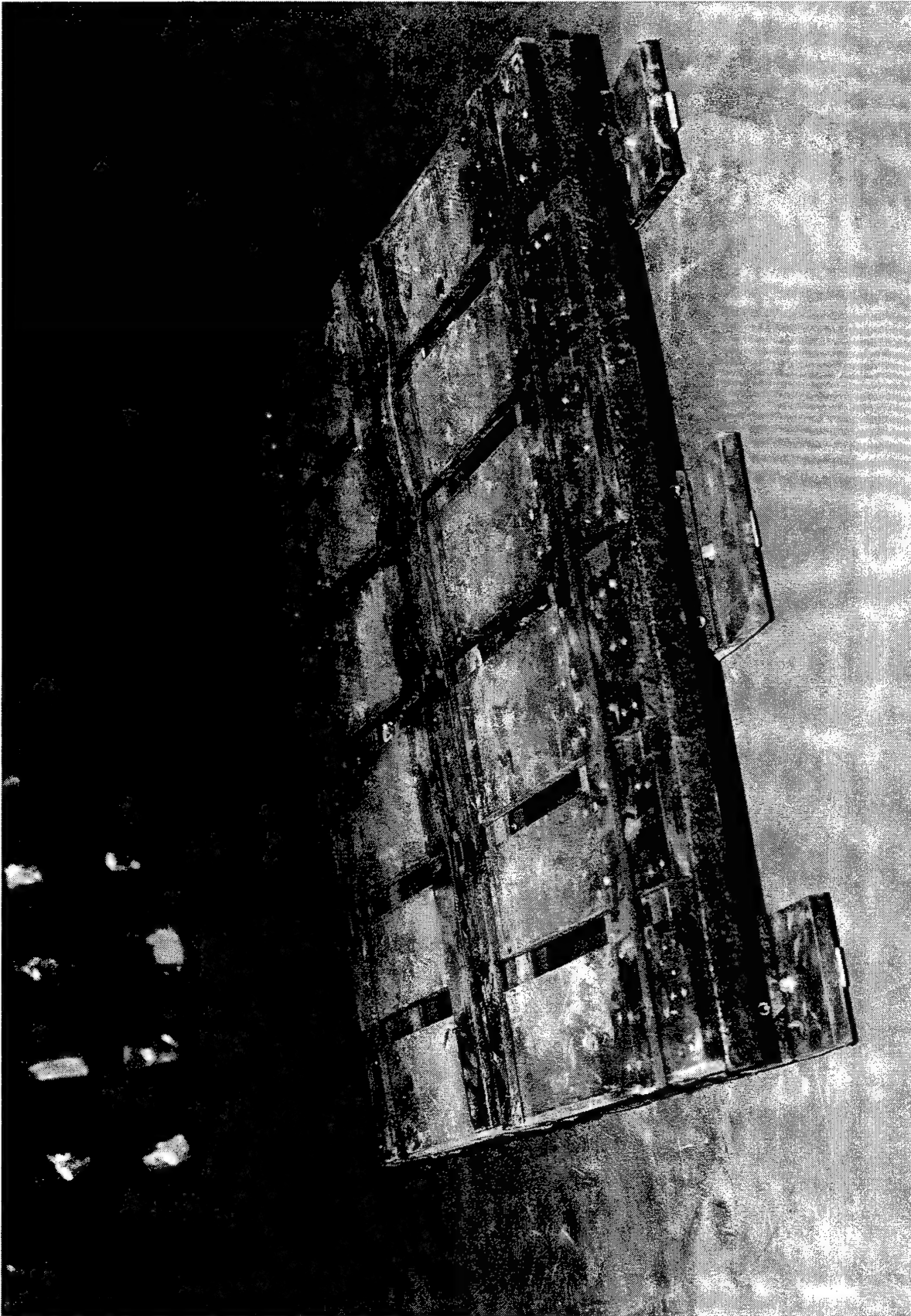


	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN96-140-2695. This photo shows one end of a bridge assembly. Note the steel pieces are welded together and bolted to the pallet.		



U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -
SAVANNA, IL

AO317-SCN96-140-2692. This photo shows the palletized unit load of test sample no. 4 following testing.



	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN96-140-2702. This photo shows the pallet of test sample no. 4 following testing. The plastic strips that replace the deck dunnage plywood are also shown.		

PART 7

DRAWINGS

APPENDIX 7B

UNITIZATION PROCEDURES FOR COMPLETE ROUNDS PACKED IN CYLINDRICAL METAL CONTAINERS ON 4-WAY ENTRY PALLETS *

PA116 SERIES CONTAINER

INDEX

<u>ITEM</u>	<u>PAGE(S)</u>
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FILLERS AND INSTALLATION PROCEDURES FOR OMITTED CONTAINERS- - - - -	6, 7
BLANK PAGE - - - - -	8

NOTICE: THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH
THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4079-20PM1002.

* SEE GENERAL NOTE "L" ON PAGE 3.

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U.S. ARMY MATERIEL COMMAND DRAWING

APPROVED, U.S. ARMY ARMAMENT, MUNITIONS AND CHEMICAL COMMAND		DRAFTSMAN		INGEBORG DEPPE			
		ENGINEER		SANDRA M. SCHULTZ			
<div style="display: flex; justify-content: space-between;"> AMSTA-ARA-ESK AMSMC-TMJ </div>		SUPPLY ENGINEERING DIVISION	TRANSPORTATION ENGINEERING DIVISION		VALIDATION ENGINEERING DIVISION		
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U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL		REVISION NO. 3	NOVEMBER 1994	19	48	4079/ 7B	20PM 1002
SEE THE REVISION LISTING ON PAGE 2							

DO NOT SCALE

PALLET UNIT DATA				
ITEMS INCLUDED		HAZARD CLASS AND DIVISION		APPROX WEIGHT LBS
NSN	DDOIC	DD CLASS	COMP GROUP	
1315				
01-250-8636	C784	(08)1.2	C	2.412
01-369-6612	C784	(08)1.2	C	2.412
01-242-4796	C785	(08)1.2	C	2.082
01-288-5545	C785	(08)1.2	C	2.082

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REVISIONS

REVISION NO. 1, DATED MARCH 1989,
CONSISTS OF:

1. CHANGING THE DD CLASSES IN THE "PALLET UNIT DATA" CHART.
2. ADDING GENERAL NOTE "N".
3. ADDING ITEM BY NATIONAL STOCK NUMBER TO "PALLET UNIT DATA" CHART.

REVISION NO. 2, DATED MAY 1994,
CONSISTS OF:

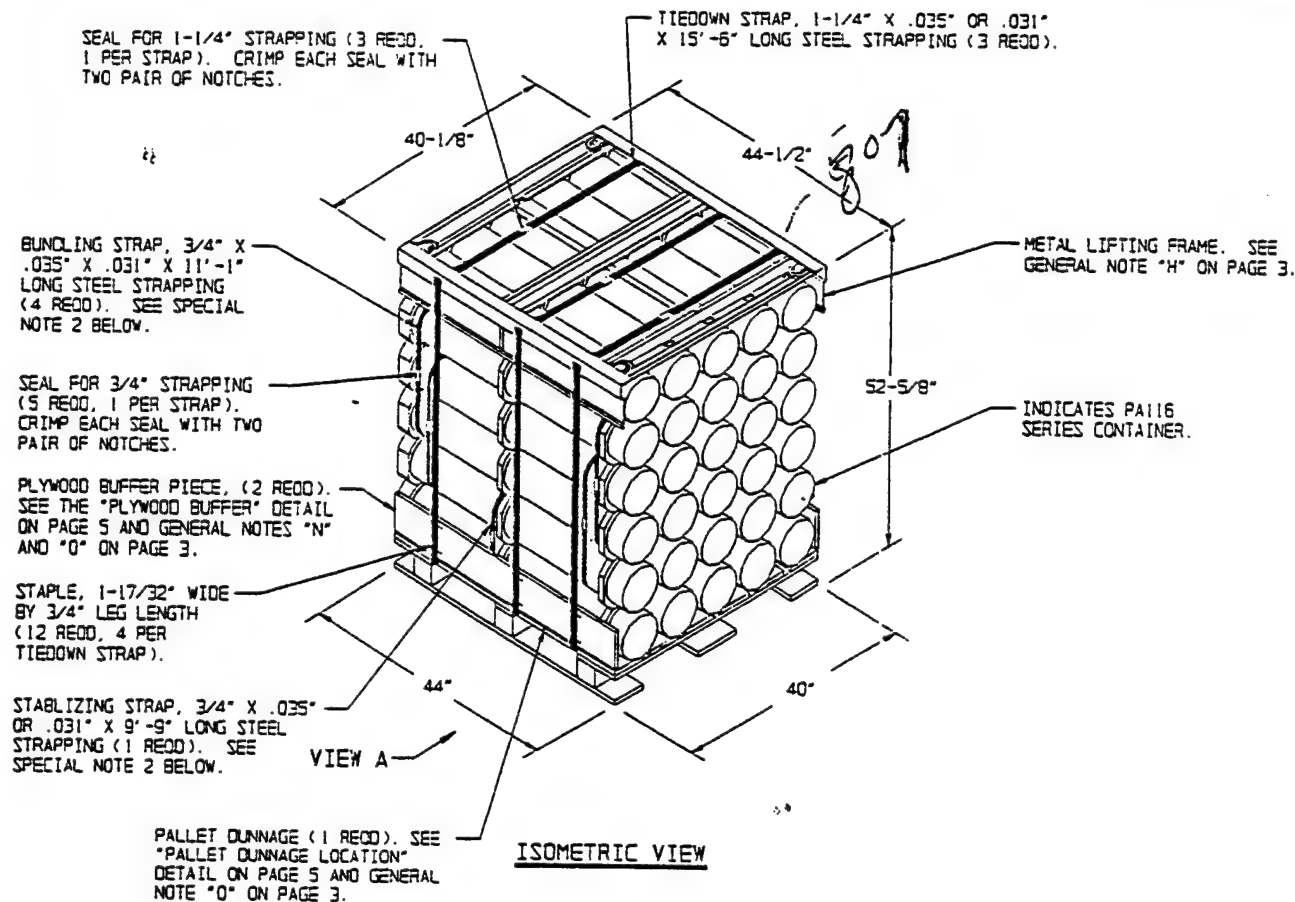
1. CHANGING DRAWING IN ACCORDANCE WITH ECP M3K3014.

REVISION NO. 3, DATED NOVEMBER 1994,
CONSISTS OF:

1. CHANGING DRAWING IN ACCORDANCE WITH ECP M4T3006 AND ECP M3T4321.

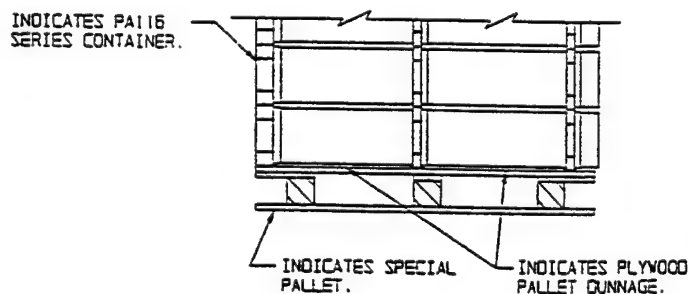
GENERAL NOTES

- A. THIS APPENDIX CANNOT STAND ALONE BUT MUST BE USED IN CONJUNCTION WITH THE BASIC UNITIZATION PROCEDURES DRAWING 19-48-4079-20PM1002. TO PRODUCE AN APPROVED UNIT LOAD, ALL PERTINENT PROCEDURES, SPECIFICATIONS AND CRITERIA SET FORTH WITHIN THE BASIC DRAWING WILL APPLY TO THE PROCEDURES DELINEATED IN THIS APPENDIX. ANY EXCEPTIONS TO THE BASIC PROCEDURES ARE SPECIFIED IN THIS APPENDIX.
- B. DIMENSIONS, CUBE AND WEIGHT OF A PALLET UNIT WILL VARY SLIGHTLY DEPENDING UPON THE ACTUAL DIMENSIONS OF THE CONTAINER AND THE WEIGHT OF THE SPECIFIC ITEM BEING UNITIZED.
- C. FOR OUTLOADING OF THE ITEMS COVERED BY THIS APPENDIX CONTACT THE U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL, ATTN: SMCAC-DET, SAVANNA, IL 61074-9639. FOR STORAGE OF THE ITEMS COVERED BY THIS APPENDIX, CONTACT THE U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL, ATTN: SMCAC-DES, SAVANNA, IL 61074-9639 FOR SPECIFIC PROCEDURAL GUIDANCE.
- D. FOR METHOD OF SECURING A STRAP CUTTER TO THE PALLET UNIT, SEE AMC DRAWING 19-48-4127-20P1000.
- E. IF ITEMS COVERED HEREIN ARE UNITIZED PRIOR TO ISSUANCE OF THIS APPENDIX, THE CONTAINERS NEED NOT BE REUNITIZED SOLELY TO CONFORM TO THIS APPENDIX.
- F. FOR DETAILS OF THE PA116 SERIES CONTAINER, SEE U.S. ARMY ARMAMENT RESEARCH AND DEVELOPMENT CENTER DRAWING NO. 9386831.
- CONTAINER DIMENSIONS - - - 44-1/2" LONG X 7-3/4" WIDE
X 7-3/4" HIGH
CONTAINER CUBE - - - - - 1.5 CUBIC FEET (APPROX)
CONTAINER WEIGHT
(WITH ROUNDS) - - - - - 64 OR 75 POUNDS (APPROX)
(EMPTY) - - - - - 23 POUNDS (APPROX)
- G. THE UNITIZATION PROCEDURES DEPICTED HEREIN MAY ALSO BE USED FOR UNITIZING COMPLETE ROUNDS WHEN IDENTIFIED BY DIFFERENT NATIONAL STOCK NUMBERS (NSN) THAN THOSE SHOWN ON PAGE 2, PROVIDED THE ITEM IS PACKED IN THE SAME CONTAINER. THE EXPLOSIVE CLASSIFICATION OF OTHER ITEMS MAY BE DIFFERENT THAN WHAT IS SHOWN.
- H. FOR DETAILS OF THE METAL LIFTING FRAME SEE U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL DRAWING AC200000807 AND MILITARY SPECIFICATION MIL-A-70788.
- J. FULL IDENTIFICATION MARKINGS IN ACCORDANCE WITH MIL-STD-129-1 TO INCLUDE NSN AND DODIC, QUANTITY AND NOMENCLATURE, LOT NUMBER AND GROSS WEIGHT OF THE LOAD, SHALL BE MARKED ON TAGS LOCATED ON OPPOSITE UPPER CORNERS OF THE LOAD.
- K. BAR CODE LABELS ARE REQUIRED ON THE STRAPS OF OPPOSITE CORNERS. SEE MIL-STD-129-1.
- L. THE SPECIAL PALLET WILL BE CONSTRUCTED AND ASSEMBLED IN ACCORDANCE WITH A MILITARY SPECIFICATION MIL-P-15011, STYLE 1, TYPE I, CLASS 1 PALLET WITH THE EXCEPTION THAT THE TOP AND BOTTOM DECK BOARDS WILL BE 44" LONG INSTEAD OF 48". ALL OTHER REQUIREMENTS SPECIFIED WITHIN MIL-P-15011 FOR A STYLE 1, TYPE I, CLASS 1 PALLET WILL APPLY TO THE PALLET SPECIFIED WITHIN THIS DRAWING.
- M. THE MODIFIED STYLE 1 PALLET DELINEATED IN THE DETAIL ON PAGE 5 NEED NOT HAVE CHAMFERS OR STRAP SLOTS AS SPECIFIED WITHIN MILITARY SPECIFICATION MIL-P-15011 WHEN USED FOR THE UNITIZATION OF THE ITEMS COVERED BY THIS APPENDIX.
- N. THE THICKNESS OF THE PLYWOOD BUFFER PIECES AS DEPICTED IN THE UNIT LOAD ON PAGE 5 MUST BE ADJUSTED, AS REQUIRED, TO COMPLY WITH THE DIMENSIONAL VARIANCE OF THE PA116 CONTAINERS, SO AS TO COMPLETELY FILL OUT THE PALLET. THE LENGTH DIMENSION OF THE PALLET UNIT AT THE PLYWOOD BUFFER PIECES MUST BE WITHIN THE TOLERANCE OF PLUS 1/4", MINUS 0" OF THE LENGTH DIMENSION AT THE TOP OF THE PALLET UNIT. NOTE: NOMINAL 1" X 6" MATERIAL MAY BE SUBSTITUTED FOR THE PLYWOOD IF IT WILL CAUSE THE PALLET UNIT DIMENSIONS TO FALL WITHIN THE TOLERANCES OUTLINED ABOVE, AND IF SO DESIRED.
- O. ALL DUNNAGE SHALL BE PRESERVATIVE TREATED IN ACCORDANCE WITH GENERAL NOTE "X" IN THE BASIC PROCEDURES.

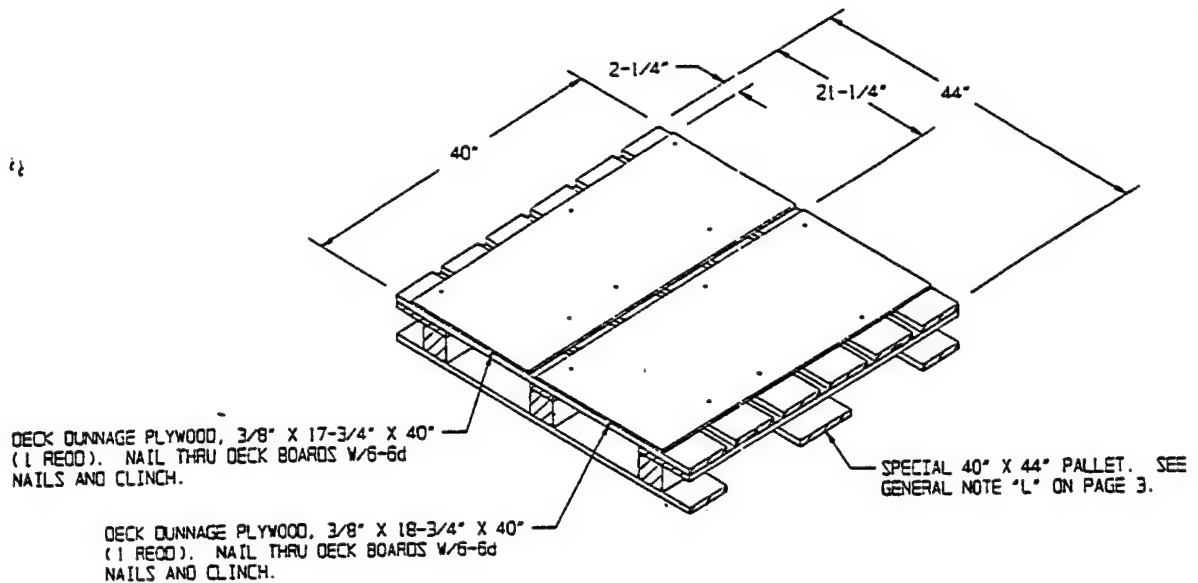


SPECIAL NOTES:

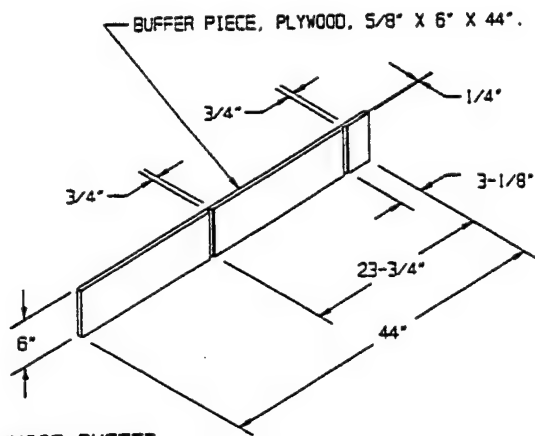
1. ALTHOUGH THE CONTAINERS DEPICTED IN THE UNIT LOAD ABOVE ARE CONSTRUCTED WITH INTERLOCKING DEVICES, THE INTERLOCKS WILL NOT FUNCTION PROPERLY UNLESS THE CONTAINERS ARE POSITIONED SO THAT THE "PINS" OF THE INTERLOCKS ARE IN AN UPRIGHT ORIENTATION. THIS ORIENTATION WILL PRECLUDE INTERFERENCE OF THE "PINS" AND THE PLYWOOD PALLET DUNNAGE AND WILL AID IN THE PREVENTION OF CONTAINER MOVEMENT, BOTH Laterally AND LONGITUDINALLY, DURING SHIPMENT OF THE UNIT LOAD.
2. BUNDLING STRAPS AND STABILIZING STRAP MUST BE TENSIONED AND SEALED PRIOR TO THE APPLICATION OF THE TIEDOWN STRAPS. ALL STRAPS MUST BE INSTALLED AS CLOSE AS POSSIBLE TO THE CONTAINER RINGS. CAUTION: STRAPS MUST NOT BE ALLOWED TO OVERLAP.



PARTIAL VIEW A
(PLYWOOD BUFFER HAS BEEN OMITTED FOR CLARITY).



PALLET DUNNAGE LOCATION
SEE GENERAL NOTE "O" ON PAGE 3.



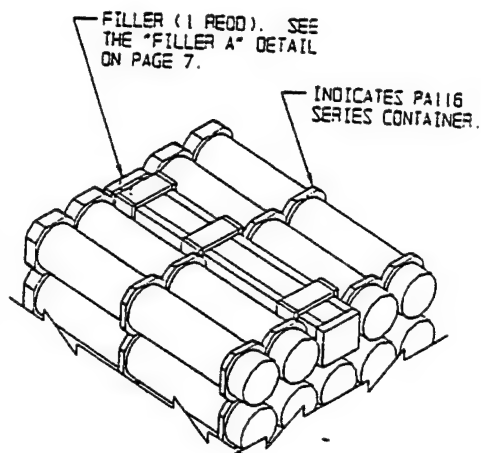
PLYWOOD BUFFER
SEE GENERAL NOTES "N" AND "O" ON PAGE 3.

BILL OF MATERIAL		
NAILS	NO. REQD	POUNDS
6d (2")	12	0.07
SPECIAL PALLET, 40" X 44"	1 REQD	77 LBS
STEEL STRAPPING, 3/4"	54.08' REQD	3.86 LBS
STEEL STRAPPING, 1-1/4"	46.50' REQD	6.64 LBS
SEAL FOR 3/4" STRAPPING	5 REQD	NIL
SEAL FOR 1-1/4" STRAPPING	3 REQD	NIL
PLYWOOD, 3/8"	10.14 SQ FT REQD	10.46 LBS
PLYWOOD, 5/8"	3.67 SQ FT REQD	6.30 LBS
STAPLES FOR 1-1/4" STRAPPING	12 REQD	NIL
METAL LIFTING FRAME	1 REQD	57 LBS

UNIT DATA

WEIGHT

CUBE	54.2 CUBIC FEET (APPROX)	
CONTAINER, PA116 SERIES	30 EA AT 75 LBS	2,250 LBS (APPROX)
DUNNAGE		85 LBS
PALLET		77 LBS
TOTAL WEIGHT		2,412 LBS (APPROX)

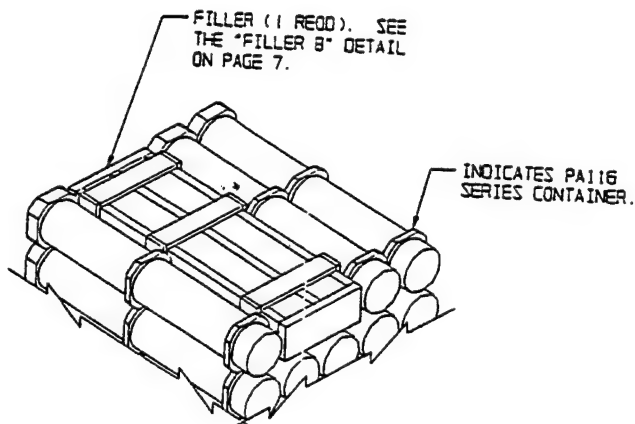


SPECIAL NOTES:

1. WHEN FIVE CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMPLETE LAYER OF CONTAINERS ARE TO BE OMITTED. WHEN FOUR CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OF FILLER ASSEMBLIES DEPICTED ON PAGE 7 MUST BE USED. WHEN THREE OR LESS CONTAINERS ARE TO BE OMITTED FROM A PALLET UNIT, A COMBINATION OR ONE OF THE FILLER ASSEMBLIES DEPICTED ON PAGE 7 MAY BE USED. ALL FILLER ASSEMBLIES MUST BE INSTALLED IN THE MIDDLE OF THE LAYER OR LAYERS OF A PALLET UNIT.
2. WHEN A "FILLER A" ASSEMBLY IS USED IN COMBINATION WITH A "FILLER B" OR "FILLER C" ASSEMBLY THE "FILLER A" ASSEMBLY MUST BE POSITIONED IN THE SECOND LAYER OF CONTAINERS FROM THE TOP OF THE PALLET UNIT AND MUST HAVE ITS OVERALL HEIGHT REDUCED FROM 7-1/4" TO 7" AND ALSO 2" X 6" MATERIAL WILL BE SUBSTITUTED FOR THE 2" X 8" RIPPED TO 5-3/4" PIECES USED.
3. WHEN TWO "FILLER A" ASSEMBLIES ARE USED IN PLACE OF TWO OMITTED CONTAINERS, THE FILLER ASSEMBLIES WILL BE SEPARATED BY AT LEAST ONE CONTAINER TO INSURE PROPER FILLER ASSEMBLY RETENTION AND TO PRECLUDE ASSEMBLY INTERFERENCES.

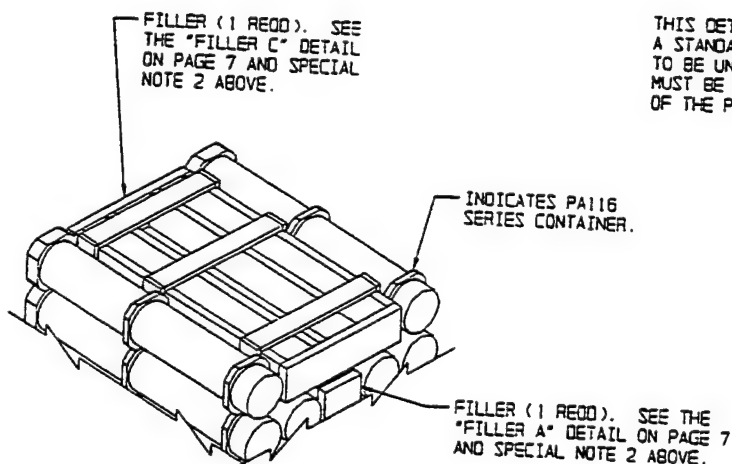
DETAIL A

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS ONE CONTAINER IS TO BE UNITIZED. THE FILLER ASSEMBLY DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.



DETAIL B

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS TWO CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLY DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYER OF THE PALLET UNIT.



DETAIL C

THIS DETAIL DEPICTS PROCEDURES TO BE USED WHEN A STANDARD PALLET UNIT MINUS FOUR CONTAINERS IS TO BE UNITIZED. THE FILLER ASSEMBLIES DEPICTED MUST BE INSTALLED IN THE MIDDLE OF THE TOP LAYERS OF THE PALLET UNIT.

END BEARING PIECE, 2" X 8"
(RIPPED TO 5-3/4") X 7
(2 REQD). NAIL TO THE
TIE PIECES W/3-10d NAILS
AT EACH JOINT.

FILL PIECE, 1" X 4" X 7-1/4"
(6 REQD). NAIL TO THE TIE PIECE
W/2-6d NAILS AND TO THE STRUTS
W/2-6d NAILS AT EACH JOINT.

BELL END
OF FILLER
ASSEMBLY.

TIE PIECE, 2" X 8"
(RIPPED TO 5-3/4")
X 41-1/2" (2 REQD).

STRUT, 1" X 4" X 7"
(6 REQD). NAIL TO
THE TIE PIECES W/2-6d
NAILS AT EACH JOINT.

FILLER A

THIS FILLER IS TO BE USED WHEN ONE CONTAINER
IS TO BE OMITTED FROM A PALLET UNIT, OR IN
COMBINATION WITH OTHER FILLER ASSEMBLIES.

END BEARING PIECE, 2" X 8"
(RIPPED TO 5-3/4") X 14-7/8"
(2 REQD). NAIL TO THE
TIE PIECES W/3-10d NAILS AT
EACH JOINT.

FILL PIECE, 1" X 4" X 7-1/4"
(6 REQD). NAIL TO THE TIE PIECE
W/2-6d NAILS AND TO THE STRUTS
W/2-6d NAILS AT EACH JOINT.

BELL END OF FILLER
ASSEMBLY.

TIE PIECE, 2" X 8"
(RIPPED TO 5-3/4")
X 41-1/2" (3 REQD).

STRUT, 1" X 4" X 14-7/8"
(6 REQD). NAIL TO THE
TIE PIECES W/2-6d NAILS
AT EACH JOINT.

FILLER B

THIS FILLER IS TO BE USED WHEN TWO CONTAINERS
ARE TO BE OMITTED FROM A PALLET UNIT, OR IN
COMBINATION WITH OTHER FILLER ASSEMBLIES.

END BEARING PIECE, 2" X 8"
(RIPPED TO 5-3/4") X 22-5/8"
(2 REQD). NAIL TO THE TIE
PIECES W/3-10d NAILS AT
EACH JOINT.

FILL PIECE, 1" X 4" X 7-1/4"
(6 REQD). NAIL TO THE TIE PIECE
W/2-6d NAILS AND TO THE STRUTS
W/2-6d NAILS AT EACH JOINT.

BELL END
OF FILLER
ASSEMBLY.

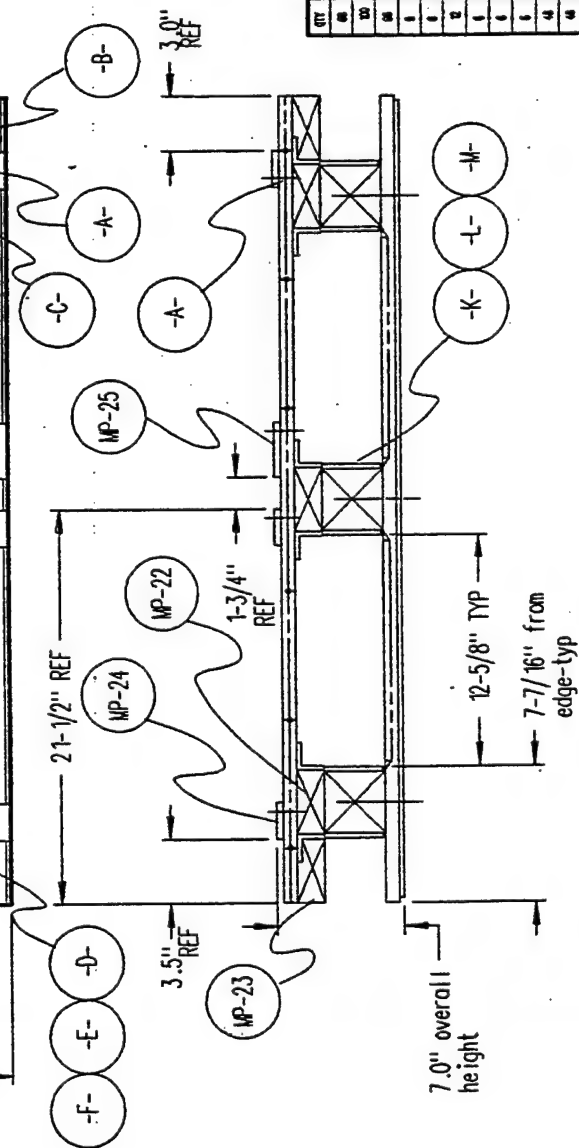
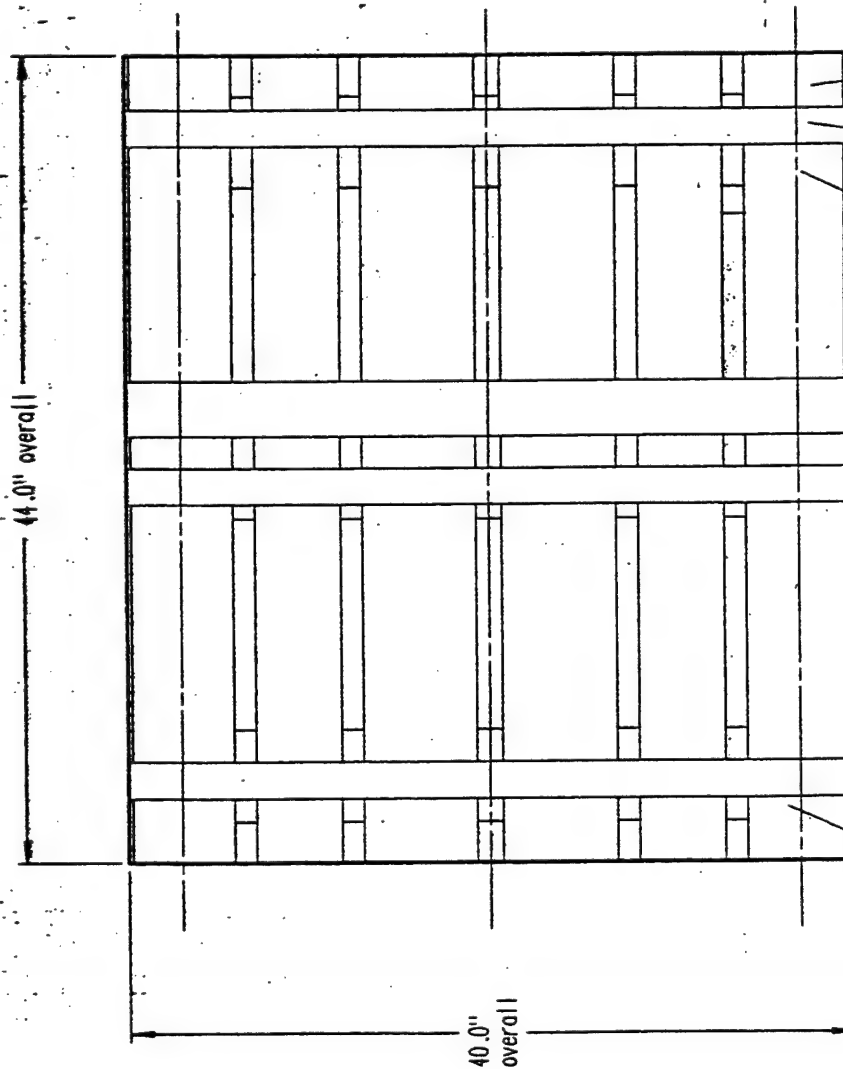
TIE PIECE, 2" X 8"
(RIPPED TO 5-3/4")
X 41-1/2" (4 REQD).

STRUT, 1" X 4" X 22-5/8"
(6 REQD). NAIL TO THE
TIE PIECES W/2-6d NAILS
AT EACH JOINT.

FILLER C

THIS FILLER IS TO BE USED WHEN THREE CONTAINERS
ARE TO BE OMITTED FROM A PALLET UNIT, OR IN
COMBINATION WITH OTHER FILLER ASSEMBLIES.

ISSUE DATE: 5/96		REV DATE:		BILL OF MATERIALS		PROJECT #:	
SHEET: 1 OF 1		BY: A. ROTONDI		AUMET IND.		NAME: MILITARY PALLET	
REV	PART NO	DESCRIPTION	QTY	MAT L DESCRIPTION/SIZE	- NOTES -	COST EA	TOTAL \$
-A-	MP-01	MAIN ASSEMBLY-COMPLETE	1	AS LISTED BELOW (for "HARDWARE" see face of Drawing)			
-A-	MP-02						
-A-	MP-03						
-A-	MP-04						
-A-	MP-05	BULKHEAD PL-TRIANGLE	12	1/4"x 3-1/4" A36 HR FLATx 5-3/8" (6-3/4"LG MAKES TWO)			
-A-	MP-06	BULKHEAD PL-RECTANGLE	6	1/4"x 3-1/4" A36 HR FLATx 7-1/2"			
-A-	MP-07	BULKHEAD ANGLE	6	1/4"x 1-1/2"x 1-1/2" A588 ANGLEx 39-3/4" LG			
-A-	MP-08	EDGE BAR	2	1/4"x 3/4" (STRESSPROOF BAR) x 44.0" LG			
-A-	MP-09	SKID BAR	3	1/4"x 1-1/2" A36 HR FLATx 43-1/2" LG			
-A-	MP-10	BULKHEAD ASSY/WELDMENT	1	ITEMS MP-05 to MP-09 W/PAINT • JIG DIM'S			
-A-	MP-11						
-A-	MP-12	3-1/2"sq SHORT BLOCK	6	3-1/2"sq (LUMBER) x 5-5/8" LG PLASTIC			
-A-	MP-13	3-1/2"sq LONG BLOCK	3	3-1/2"sq (LUMBER) x 7-1/2" LG			
-A-	MP-14	TOP BLANK - OUTER EDGE	2	3/4"x 5-5/8"x 44.0" LG PLASTIC			
-A-	MP-15	TOP BLANK - GROOVED	2	3/4"x 4-3/4"x 44.0" LG PLASTIC			
-A-	MP-16	TOP BLANK -CENTER SECT.	2	3/4"x 6-1/4"x 44.0" LG PLASTIC			
-A-	MP-17	TOP BLANK SCREW PATTERN	--	PATTERN FOR TOP VIEW #8 & #10 SCREWS (BLANKS TO LUMBER)			
-A-	MP-18	TOP STRAP SCREW PATTERN	--	PATTERN FOR TOP VIEW #8 SCREWS (STRAPS TO LUMBER)			
-A-	MP-19						
-A-	MP-20	BOTTOM BLANK-OUTER EDGE	2	3/4"x 5-5/8"x 44"LG PLASTIC			
-A-	MP-21	BOTTOM BLANK-CENTER SECT.	1	3/4"x 7-1/2"x 44"LG PLASTIC			
-A-	MP-22	CROSS BOARD-STANDARD	3	2"x 4" (LUMBER)x 40.0" LG PLASTIC			
-A-	MP-23	CROSS BOARD-EDGE ONLY	2	2"x 4" (LUMBER)x 40.0" LG PLASTIC			
-A-	MP-24	TOP STRAP-STANDARD	3	3/8"x 2" WIDEX 40.0" LG PLASTIC			
-A-	MP-25	TOP STRAP-SPECIAL	1	3/8"x 3" WIDEX 40.0" LG PLASTIC			
-A-	MP-26	BOTTOM BLANK SCREW PATTERN	--	PATTERN FOR BOTTOM VIEW #8 SCREWS			
-A-	MP-27						
-A-	MP-28						
-A-	MP-29						



NOTE:
SEE DWG# MP-17, MP-18 & MP-26
FOR SCREW PATTERN JIG/FIXTURE

NOTE:
SEE DWG. MP-17, MP-18 & MP-26
FOR SCREW PATTERN JIG/FIXTURE

DATE: 5/06
BY: J. ROTONDI
CHECKED: J. ROTONDI

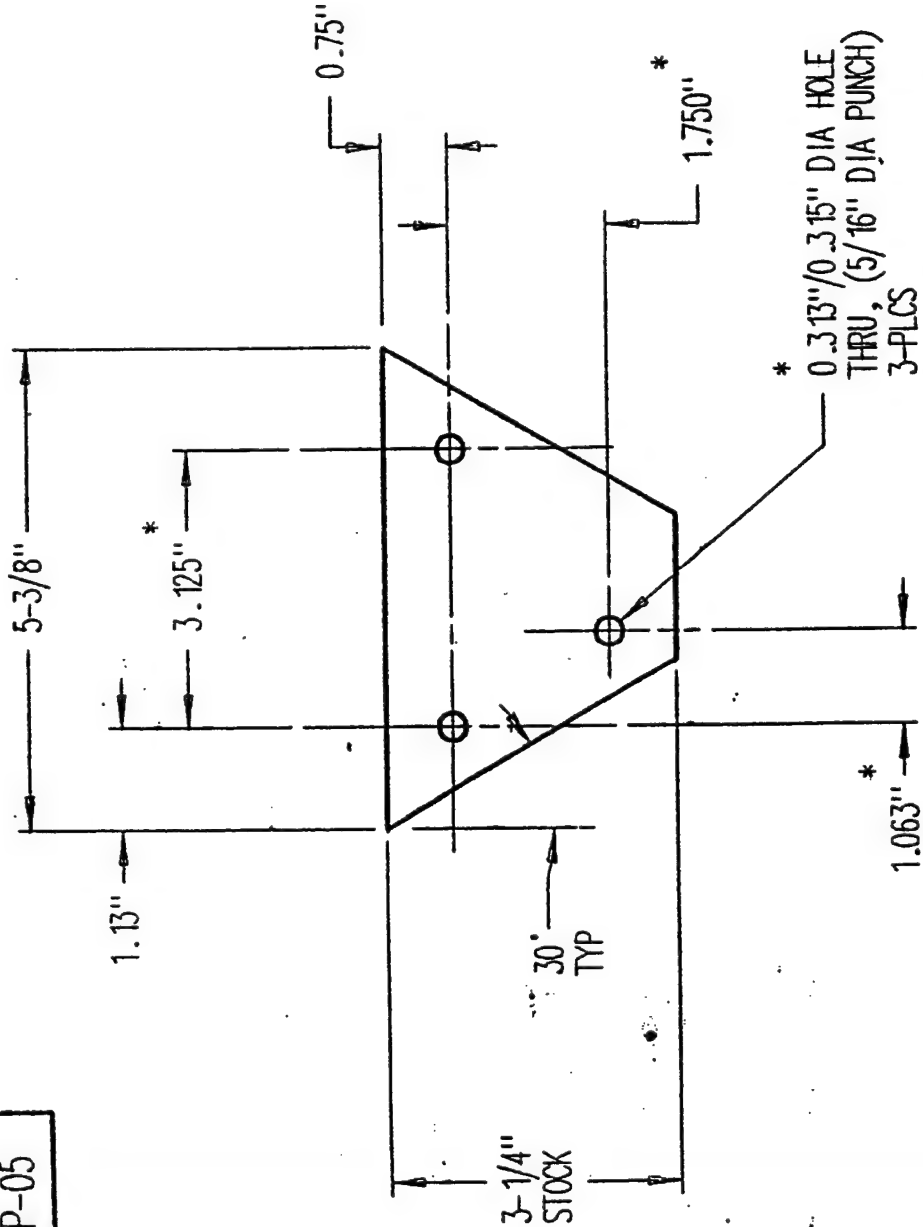
REV

QTY	ITEM	DESCRIPTION
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1	MP-100	BLANK 800

REV

QTY	ITEM	DESCRIPTION
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MP-05

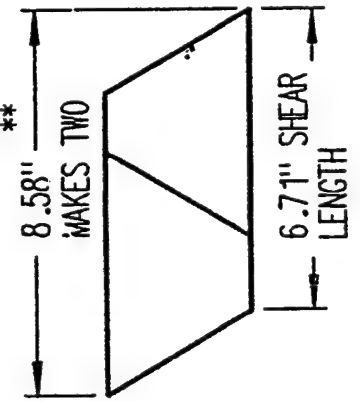


1/4" TK K
STOCK

- NOTES: (unless otherwise noted)
- 1) ALL DIM'S MARKED THUS "4" ARE TOLERANCES AS NOTED, AND FIXED BY JIGS/TOOLING REPEATED WITHIN ± 0.001 "
 - 2) ALL DIM'S MARKED THUS "4**" ARE TOLERANCES AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32$ "
 - 3) BREAK ALL EDGES $1/32$ "

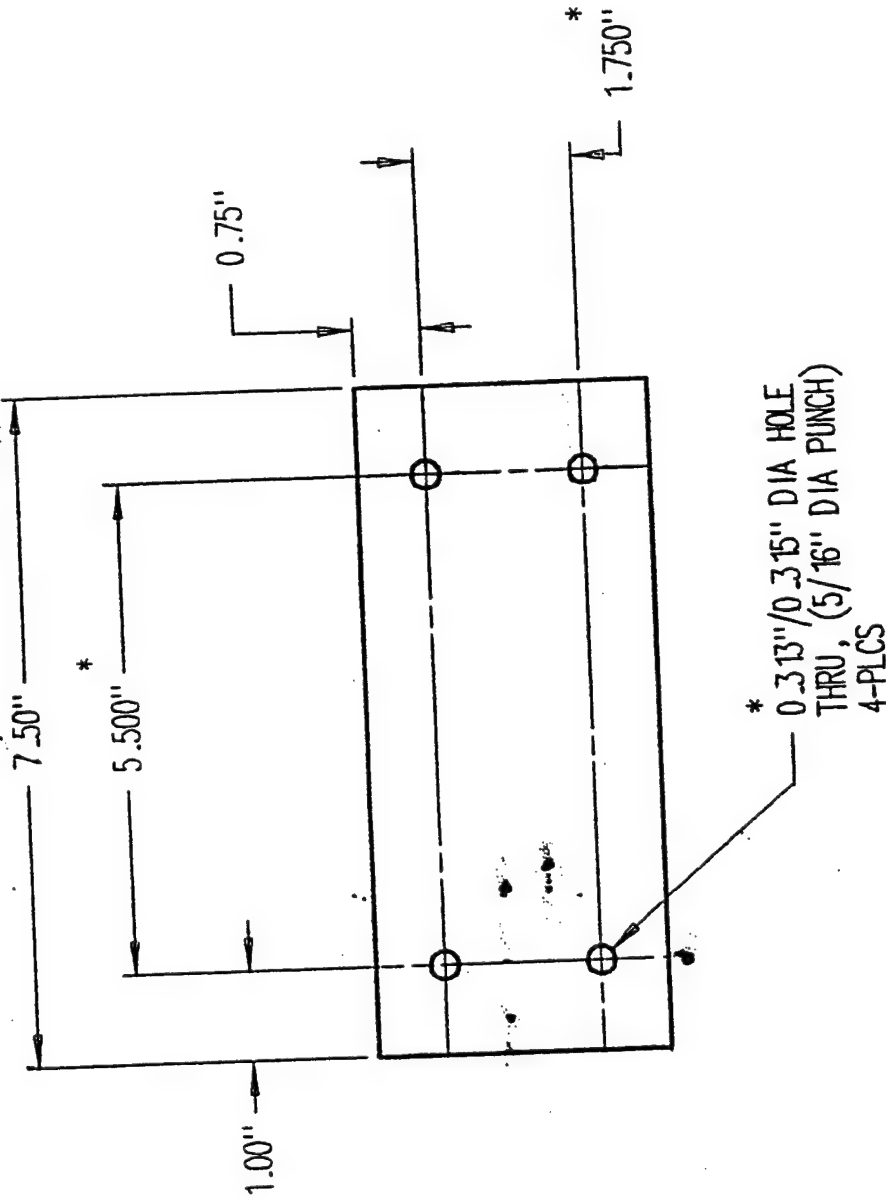
2.763 lbs/ft - (20 ft stock)
FOR 1/4"x 3-1/4" STEEL FLAT
APPROX WT. (STOCK PART) PER PART= .806 lbs
WITH HOLES, WT PER PART= .789 lbs

SHEARING
LAYOUT
MAKES TWO PARTS



TOLERANCE: (UNLESS SPECIFIED) X.XX ± 0.005 " X.X ± 0.010 " X.X ± 0.020 " FINISH $\pm 1/32$ "	ALUET ALUET INC. ALUMINUM BULLHEAD FLA / MILITARY	TITLE:	
		DATE: 5/96	
FINISH: SEE ENG. APP-10		BY: A. ROTOND SCALE: 1" = 1"	REV LET: -A-
QTY: 12 per pollet		Dwg No.: MF	

MP-06



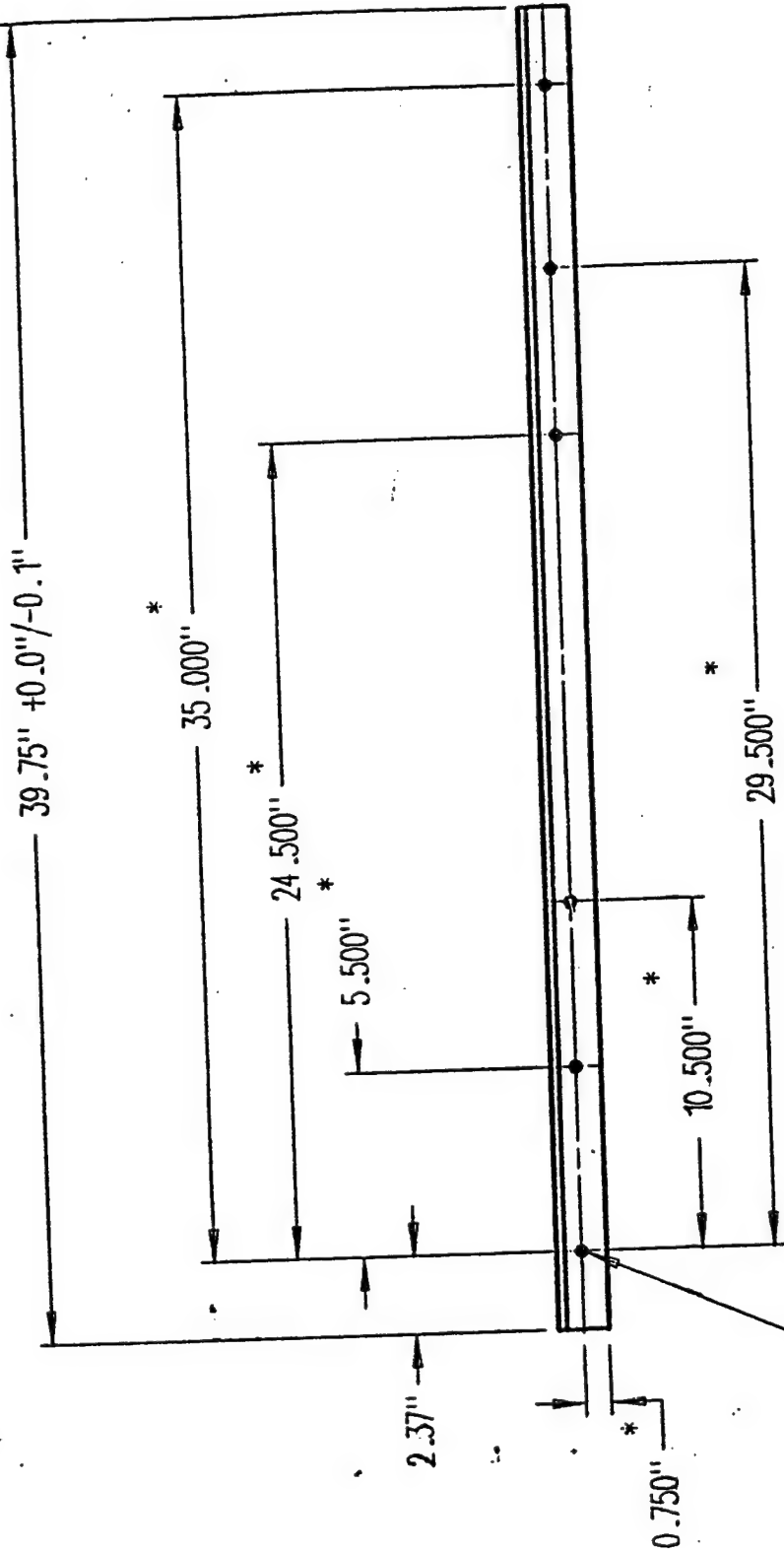
1/4" TH K
STOCK

2.763 lbs/ft - (20 ft stock)
FOR 1/4" x 3-1/4" STEEL FLAT
APPROX WT. (STOCK PART) PER PART = 1.726 lbs
WITH HOLES WT. PER PART = 1.704 lbs

- NOTES: (unless otherwise noted)
- 1) ALL DIM'S MARKED THUS "*" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN $\pm 0.001"$
 - 2) ALL DIM'S MARKED THUS "**" ARE TOLERANCED AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32"$
 - 3) BREAK ALL EDGES $1/32"$

FINISH: SEE Dwg. A6-11		ALKEY IN ALUM	
TOLERANCE: (UNLESS SPECIFIED) 1.000 ± 0.005 1.25 ± 0.010 1.50 ± 0.015 1.75 ± 0.020 2.00 ± 0.025		TITLE: BULKHEAD RJ / MILITARY	
WT. L: A36 H.R. FLAT		DATE: 5/96	
QTY: 6 per pallet		REV LET: -*	
Dwg. No.: M		Dwg. No.: M	


MP-07

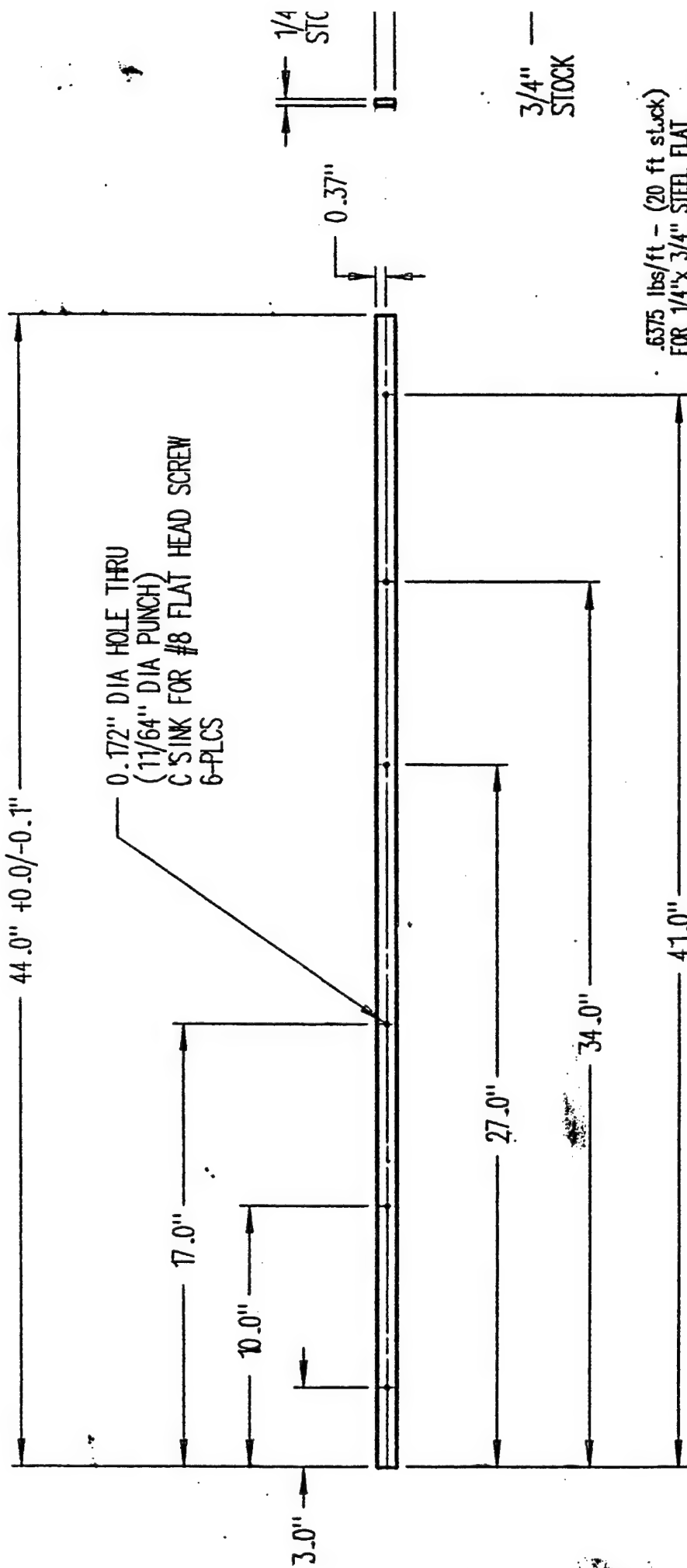


* 0.313"/0.315" DIA HOLE
THRU, (5/16" DIA PUNCH)
6-PLCS

2.34 lbs/ft - (40 ft stock)
FOR 1/4" x 1-1/2" x 1-1/2" ANGLE
APPROX WT. (STOCK PART) PER PART = 7.751 lbs
WITH HOLES, WT. PER PART = 7.718 lbs

- NOTES: (unless otherwise noted)
- 1) ALL DIM'S MARKED THUS "*" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN ± 0.001 "
 - 2) ALL DIM'S MARKED THUS "**" ARE TOLERANCED AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32$ "
 - 3) BREAK ALL EDGES $1/32$ "

FINISH: SEE Dwg. MP-07	QTY: 6 per pallet	TOLERANCE: (UNLESS SPECIFIED) X.XXX +/- 0.005" X.XX +/- 0.015" X.X +/- 0.030" FRACT +/- 1/32"	AUKET  BULKHEAD ANGLE / MILITARY-I	TITLE:	AUKET INCH VALUW.
DATE: 5/96		BY: A. ROTONDI		Dwg NO.: MP.	
SCALE: 1" = 1'-0"		REV: 1		REV: 1	

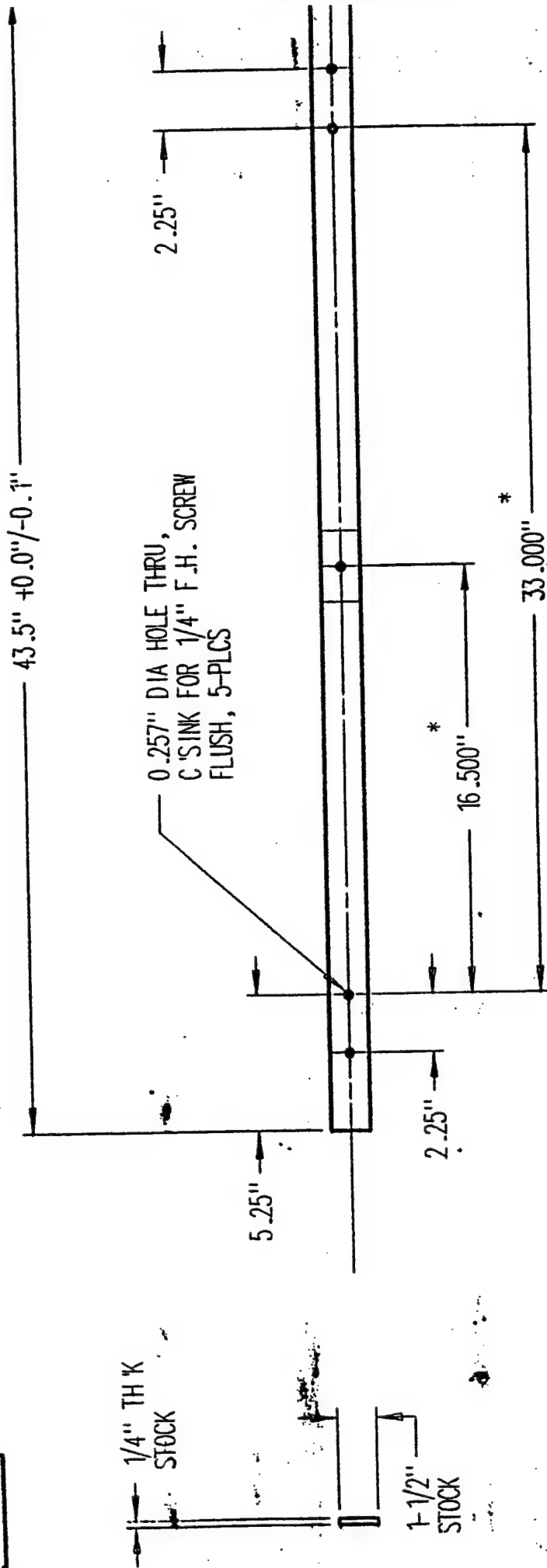


.6375 lbs/ft - (20 ft stock)
FOR 1/4" x 3/4" STEEL FLAT
APPROX WT. (STOCK PART) PER PART = 2.0
WITH HOLES, WT PER PART = 1.5

NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THUS "4.0" ARE TOLERANCED AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32$ "
2) BREAK ALL EDGES $1/32$ "

TOLERANCE: (UNLESS SPECIFIED) X.XXX ± 0.005 X.XX ± 0.005 X.X ± 0.005 FRACT $\pm 1/32$		ALUET INDUST EXLON, N TITLE: EDGE BAR / MILITARY-PULL	
FINISH: SEE DES. 14-70		DATE: 5/96 BY: A. ROTOND SCALE: \pm	
QTY: 2 per pallet		DES. NO.: MP-08	


MF-UY



1.275 lbs/ft - (20 ft stock)
FOR 1/4" X 1-1/2" STEEL FLAT
APPROX. WT. (STOCK PART) PER PART= 4.622 lbs
WITH HOLES. WT PER PART= 4.595 lbs

NOTES: (unless otherwise noted)

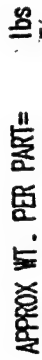
- 1) ALL DIM'S MARKED THUS "*" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN ± 0.001 "
- 2) ALL DIM'S MARKED THUS "**" ARE TOLERANCED AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32$ "
- 3) BREAK ALL EDGES $1/32$ "
- 4) PAINT PER SPEC. ~~IMP~~-P1


TWEED: (UNLESS SPECIFIED) LXXX 4/- 0.005" LXX 4/- 0.015" LXX 4/- 0.030" FRCT 4/- 1/32"	ALUKEY 	ALUKEY INDEX KALONK,	
		TITLE:	
W/L:	BR: A. ROTOANO I	DATE: 5/96	DEC NO.:
	SCALE:	REV LET:	MP
TWEED: SEE NOTES	QTY: 3 per pollet		

19/32" DIA
HOLE THRU

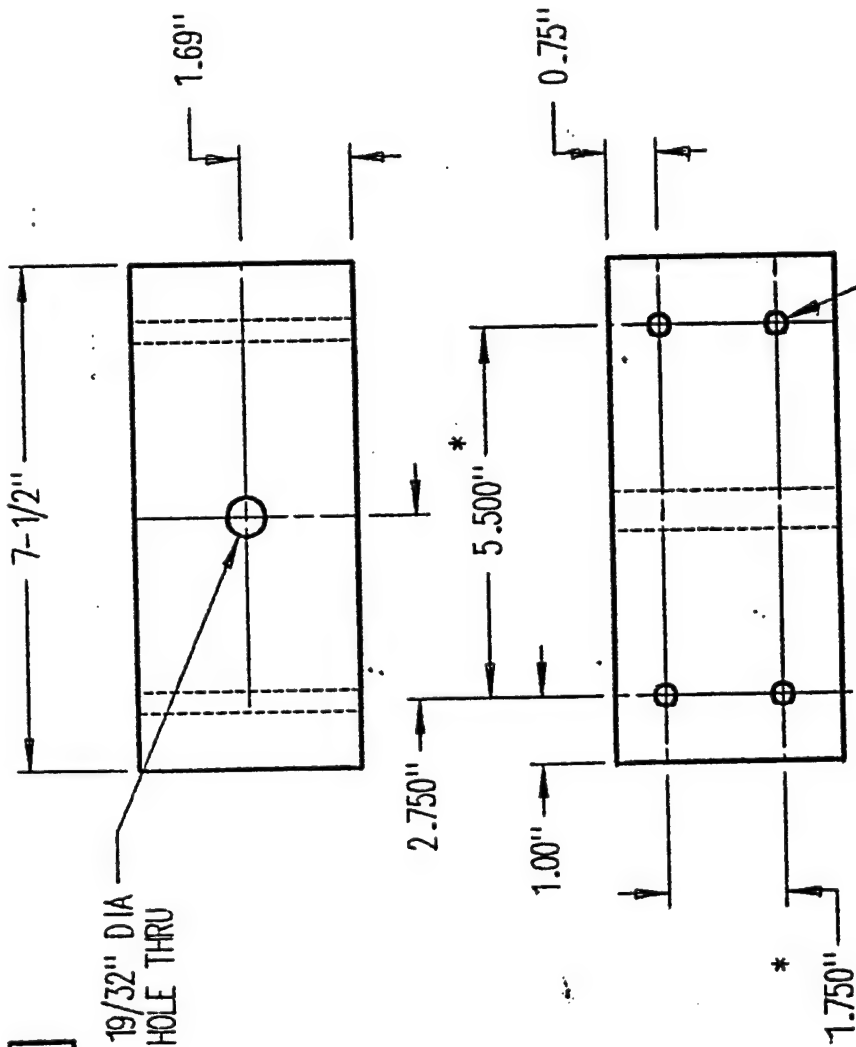


NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THIS "X" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN +/- 1/32"



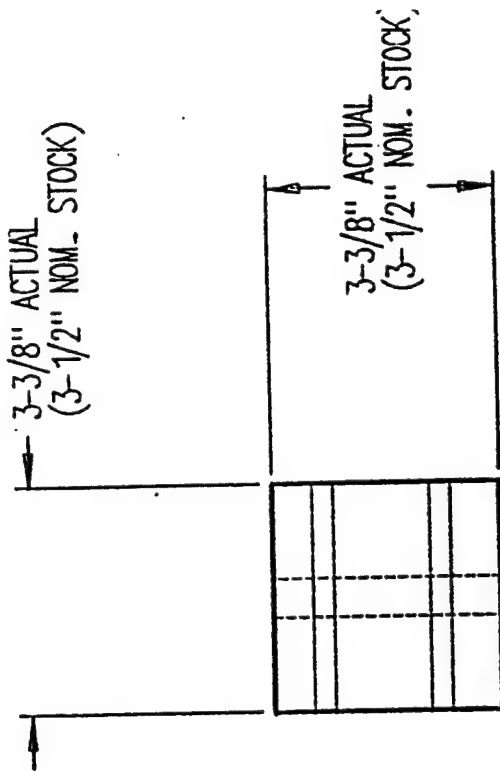
TYPESH: _____ MODE: _____	6 per pallet	TOLERANCE: (UNLESS SPECIFIED) X XX 4/- 1/4" X XX 4/- 1/32" FINCT 4/- 1/8"		ALKET  ALKETS	TITLE: 3-1/2" SQ BLOCK-1 MILITARY-PALU	ALKET INDUSTRIES BALDWIN, IND.
		W/L: 3-1/2" SQ NOM X NOTED LG				
ENT: _____		BR: A. ROTONDI		DATE: 5/96	ENG NO.: _____	MP-1
		SCALE: 1" = _____		REV LET: +		

MP-13



* 5/16" DIA HOLE THRU (0.315" DIA MIN) 10-PLCS

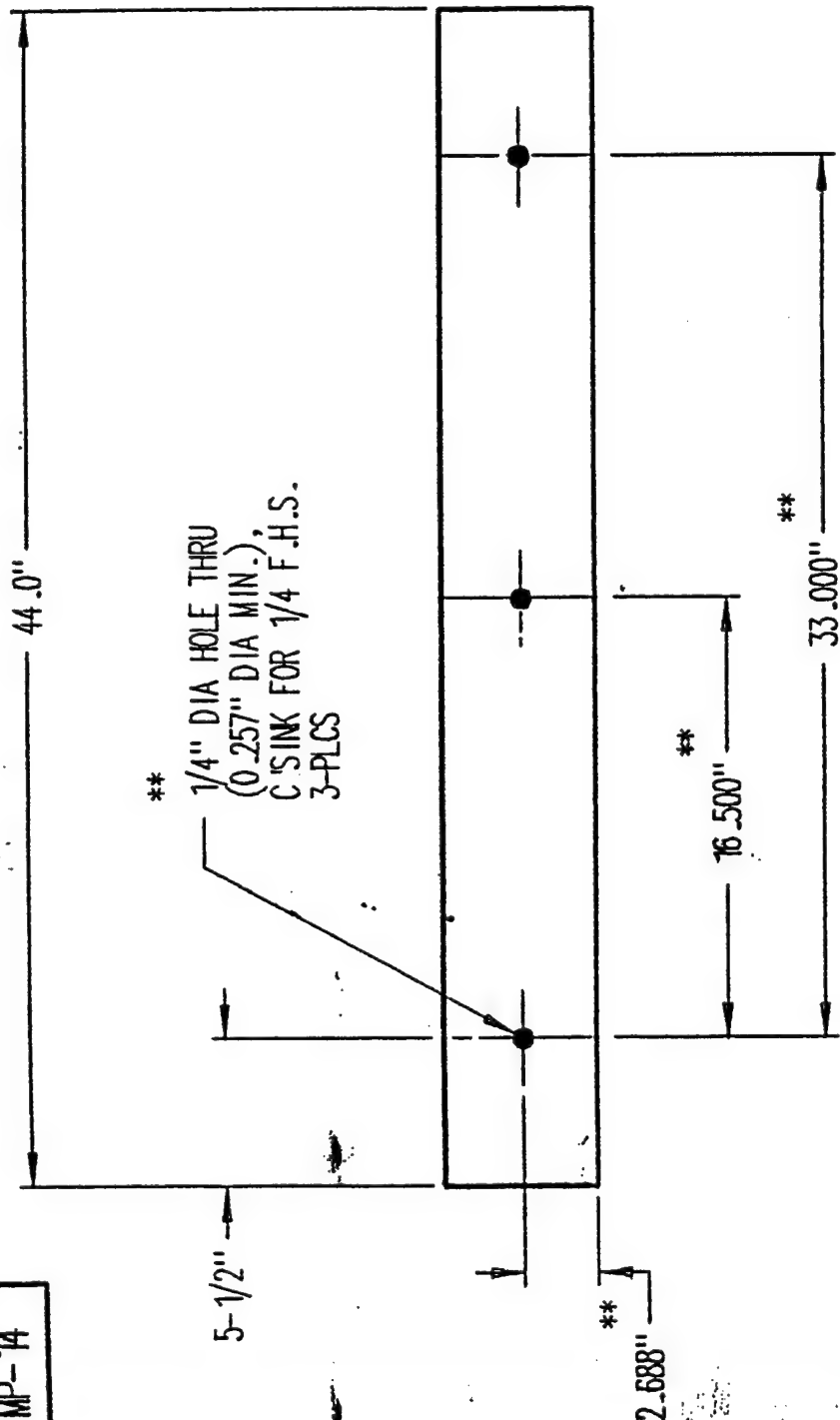
NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THUS "±" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN ± 1/32"



APPROX WT. PER PART= lbs

TOLERANCE: (UNLESS SPECIFIED) X.X ±.01 X.X ±.02 X.X ±.05		ALUJET INCL. VALUJA.	
MAY L:		TITLE: 3-1/2" SQ BLD MILITARY-	
3-1/2" SQ NOM		DATE: 5/96	
X NOTED LG		REV LET: +	
FINISH: NONE		BFG: A. ROTOND	
QTY: 3 per pallet		Dwg No.: MP.	

MP-14



3/4" NOM. TH K
BLANK STOCK

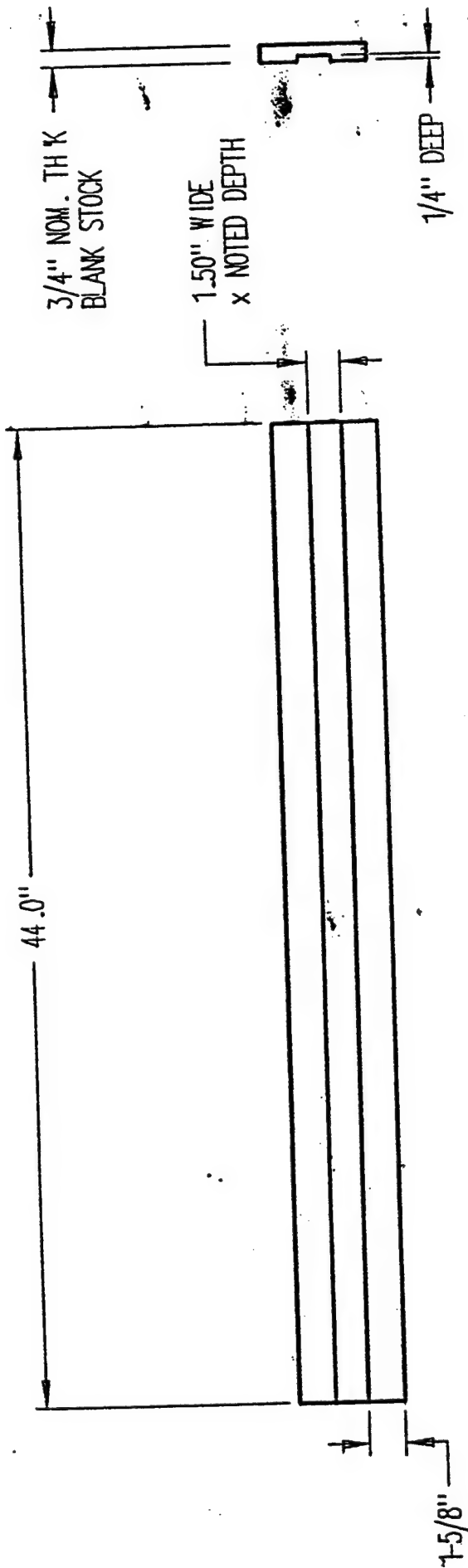
5-5/8"
STOCK

APPROX WT. PER PART= lbs

- NOTES: (unless otherwise noted)
- 1) ALL DIM'S MARKED THUS "##" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN $\pm 1/32"$
 - 2) BLANK PART & HOLE PATTERN SIMILAR TO DWG #MP-20

TOLERANCE: (UNLESS SPECIFIED) XX $\pm 1/16"$ XX $\pm 1/32"$ FRACT $\pm 1/16"$		ALUET INDO KALON.	
FURNISH: NONE		TITLE: TOP BLANK - 0 / MILITARY-1	
QTY: 2 per pallet		DATE: 5/96 REV LET: -A	
WGT L: 3/4" NOM X 5-5/8" X NOTED LG		DWG NO.: MP.	

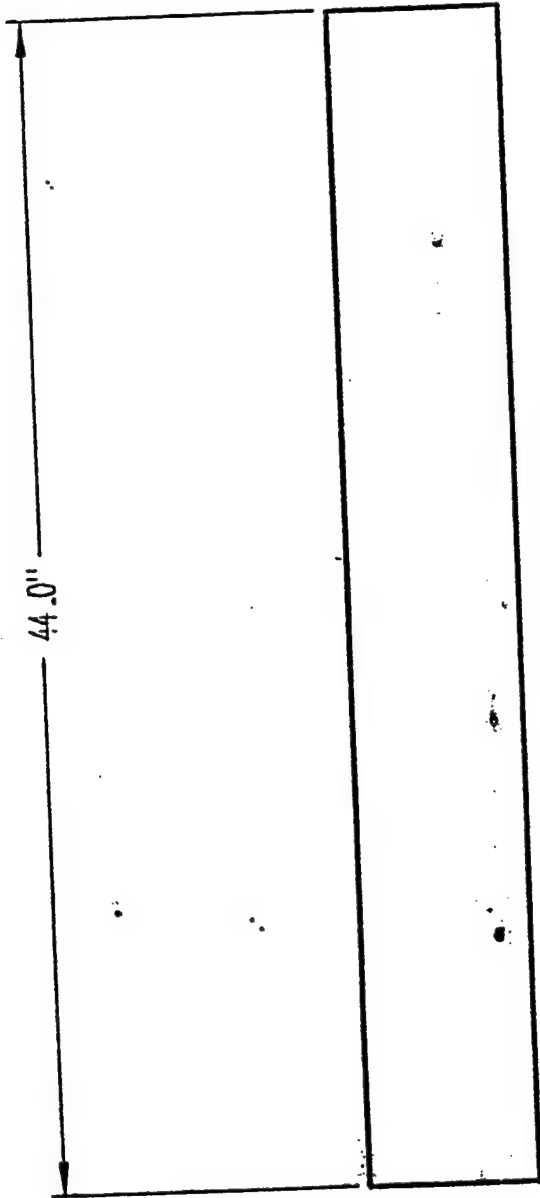
MP-15



APPROX WT. PER PART= lbs

TOLERANCES: (UNLESS SPECIFIED) X.XX ±.004 X.X ±.002 FRACT ±.001		ALKEY INDUSTRIES (LOGO)		ALKET INDUS (LOGO)	
FINISH: NONE		TITLE: TOP BLANK - GR / MILITARY-4		Dwg No.: MP-	
QTY: 2 per pallet		WT L: 3/4" NOM X 4-3/4" X NOTED LG		DATE: 5/96 BY: A. ROTONDI SCALE: 1" = 1" REV L1: -A-	

MP-16

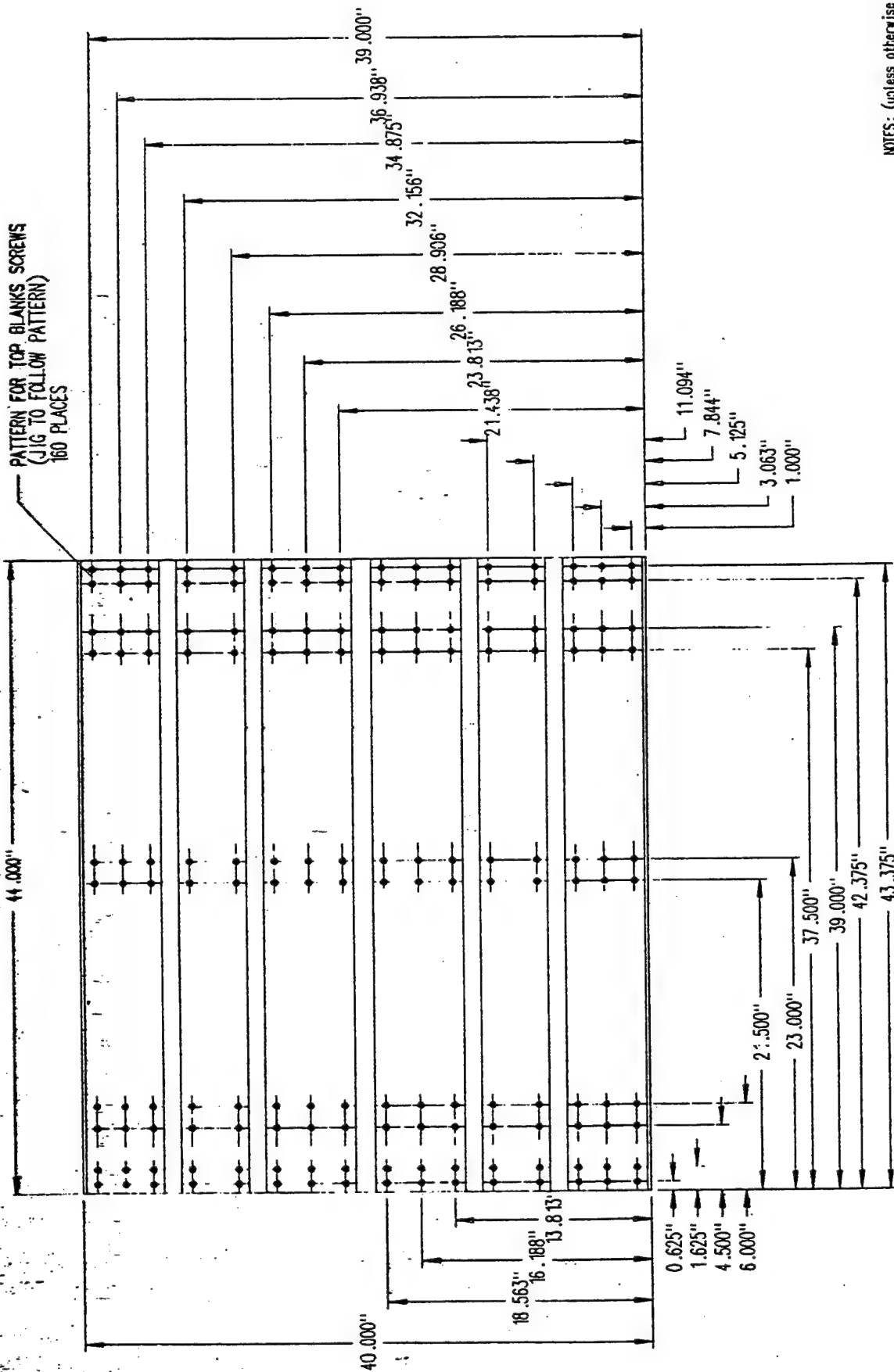


3/4" NOM. TH K
BLANK STOCK

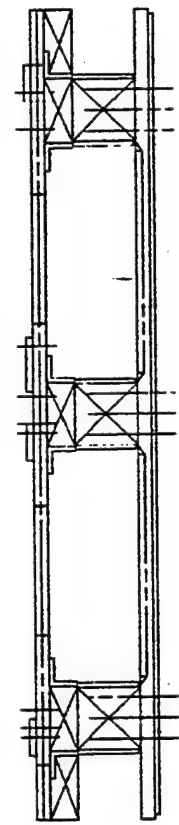
6-1/4"
STOCK

APPROX WT. PER PART= lbs

<p>FINISH: NONE</p> <p>QTY: 2 per pallet</p>		<p>TOLERANCE: (UNLESS SPECIFIED) XX ± 1/16" XX ± 1/32" FRAC ± 1/16"</p>	<p>ALUET</p>	<p>ALUET IN VALON</p>
<p>DATE: 5/96</p> <p>BY: A. ROTONDI</p> <p>SCALE: 1:1</p>		<p>TIME: TOP BLANK - 0 / MILITARY-1</p>		<p>DATE NO.: M</p>
<p>WAT L: 3/4" NOM X 6-1/4" X NOTED LG</p>		<p>REVISED: 1</p>		



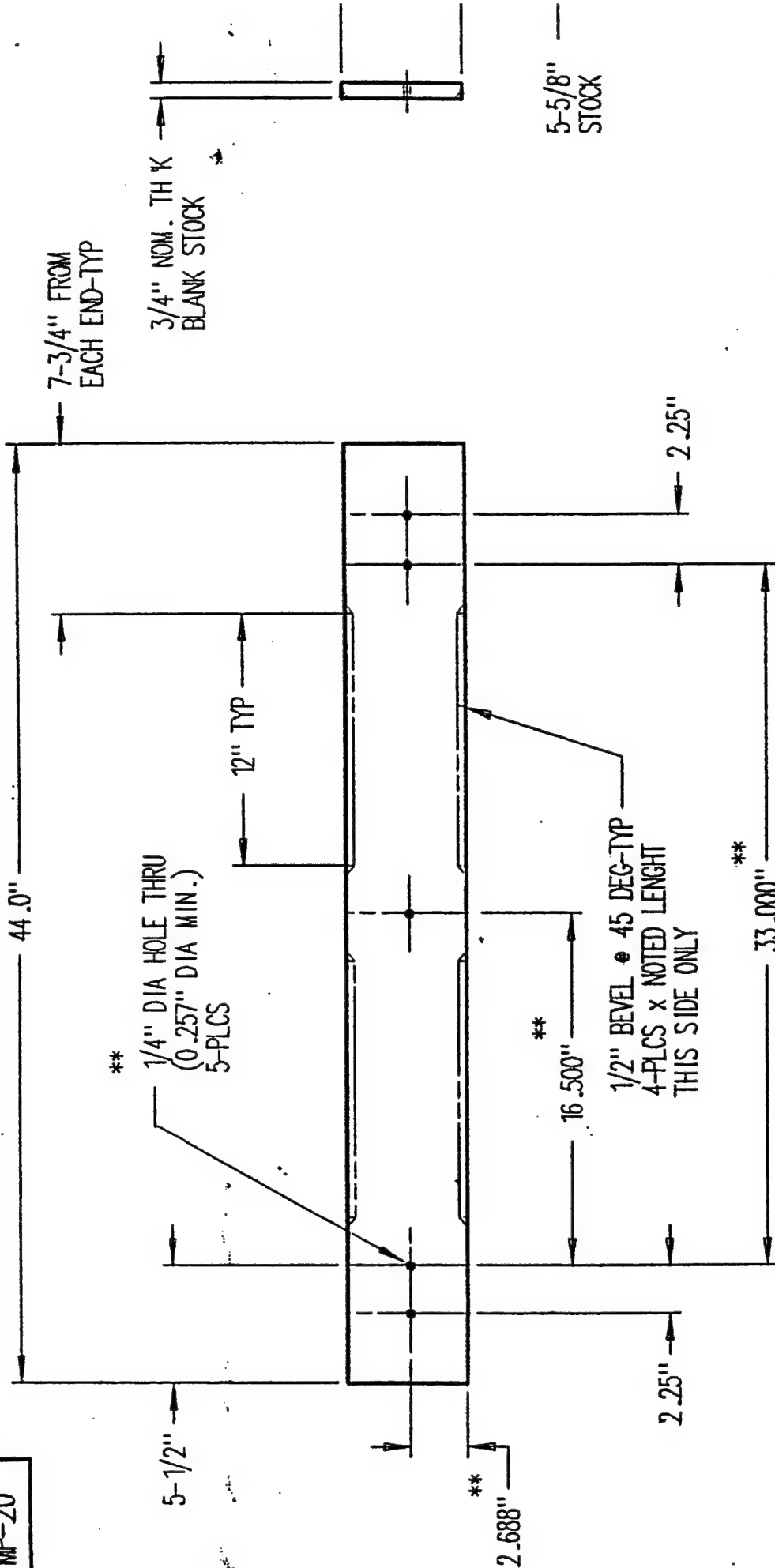
NOTES: (unless otherwise noted)
1) ALL DIMENSIONS MARKED "HUS" ARE TOLERANCED AS NOTED, AND FIXED BY FIXTURES TO BE REPEATED WITHIN $\pm 1/32"$.



REV	DATE	BY	APP'D	DESCRIPTION
1				INITIALS
2				DATE
3				REV
4				DATE
5				REV
6				DATE
7				REV
8				DATE
9				REV
10				DATE
11				REV
12				DATE
13				REV
14				DATE
15				REV
16				DATE
17				REV
18				DATE
19				REV
20				DATE

MP-20

DWG. NO.:

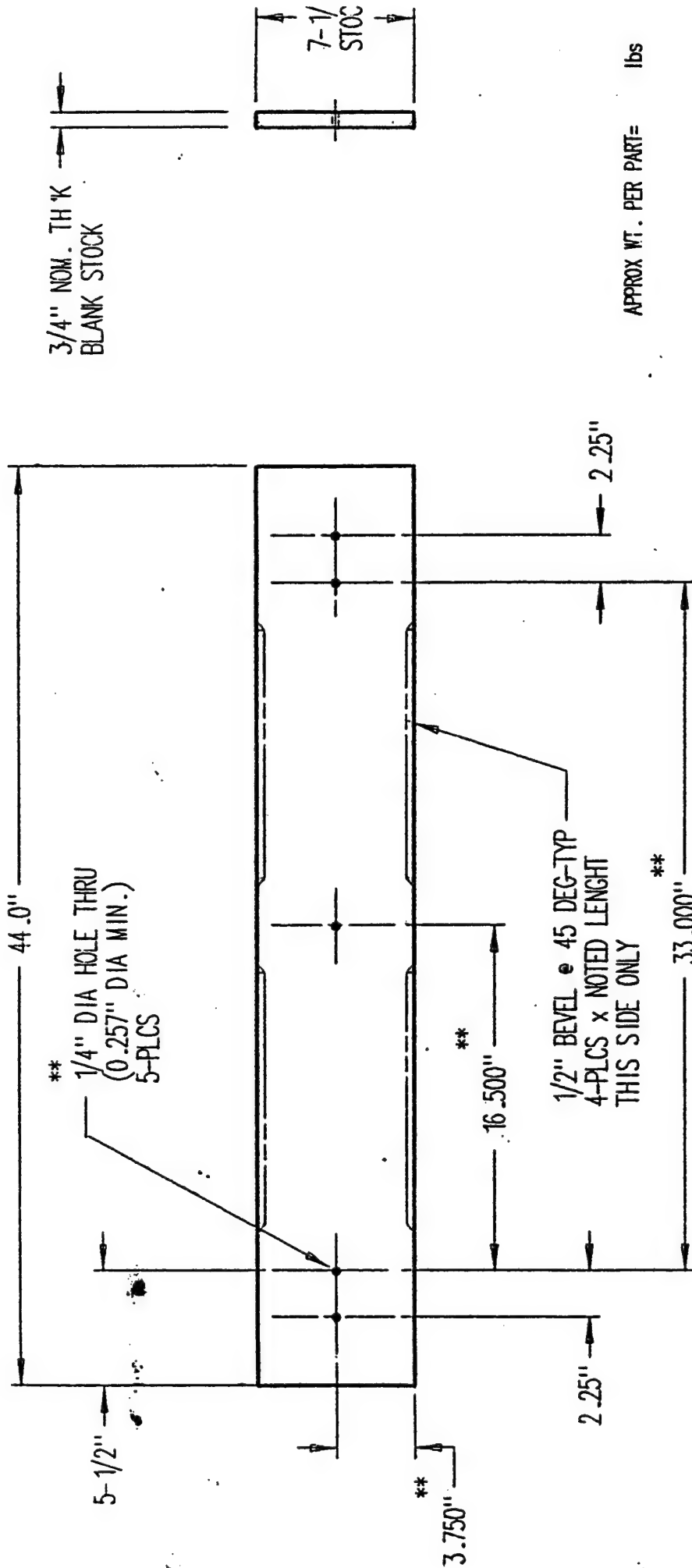


APPROX WT. PER PART= lbs

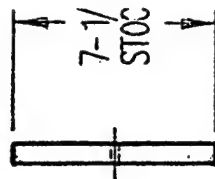
- NOTES: (unless otherwise noted)
- 1) ALL DIM'S MARKED THUS "x" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN +/- 1/32"
 - 2) BLANK PART & HOLE PATTERN SIMILAR TO DWG #MP-14

TOLERANCE: (UNLESS SPECIFIED) X.XX +/- 1/64" X.XX +/- 1/32" FRACT +/- 1/8"		ALUET TITLE: BOTTOM BLA / MILIT		ALUET VAL
FINISH: NONE		BY: A. ROTOND DATE: 5/96 SCALE: 1:1 REV LET: 1		DWG NO.: 1
QTY: 2 per pallet		WAT L: 3/4" NOM X 5-5/8" X X NOTED LG		

DOC NO: 100-4-1



3/4" NOM. THK
BLANK STOCK



APPROX WT. PER PART= lbs

NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THUS "**" ARE TOLERANCED AS NOTED, AND FIXED BY JIGS/TOOLING TO BE REPEATED WITHIN +/- 1/32"

FINISH: NONE	QTY: 1 per pallet	TOLERANCE: (UNLESS SPECIFIED) X IN: +/- 1/64" X FRACT: +/- 1/32"	ALUET A	ALUET INDS BLANK, 1	TITLE: BOTTOM BLANK - C / MILITARY-PAL	
					DATE: 5/96	
REV LET: A		REV LET: A		DOC NO.: MP-		

MP-22

40.0" +0.0"/-0.1"

*

35.0"

*

30.625"

*

6.875"

0.938"

*

13.125"

*

36.875"

*

* 5/16" DIA HOLE THRU
(0.315" DIA MIN)
6-PLCS

APPROX WT. PER PART= lbs

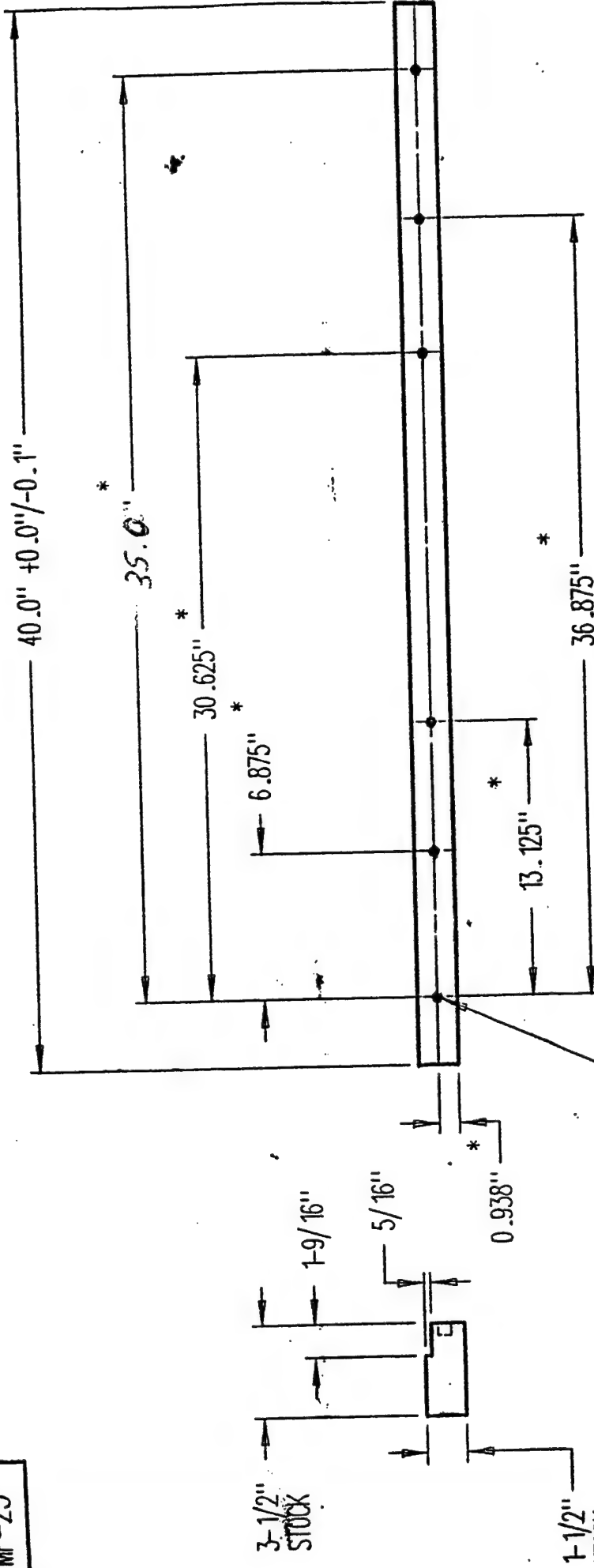
3-1/2"
STOCK

1-1/2"
STOCK

ALKEY INDEX KALOKA		TITLE: CROSS BOARD - 5 / MILITARY-PJ		Dwg NO.: MP	
ALKEY A		DATE: 5/96		REV LET: -A-	
TOLERANCE: (UNLESS SPECIFIED) X.XX +/- 1/64" X.X +/- 1/32" FRACT +/- 1/16"		DATE: 5/96		REV LET: -A-	
UNIT L: 1-1/2" NOM X 3-1/2" LG		DATE: 5/96		REV LET: -A-	
FINISH: NONE		DATE: 5/96		REV LET: -A-	
QTY: 3 per pallet		DATE: 5/96		REV LET: -A-	

NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THUS "*" ARE TOLERANCED
AS NOTED, AND FIXED BY JIGS/TOOLING TO BE
REPEATED WITHIN +/- 1/32"

MP-23



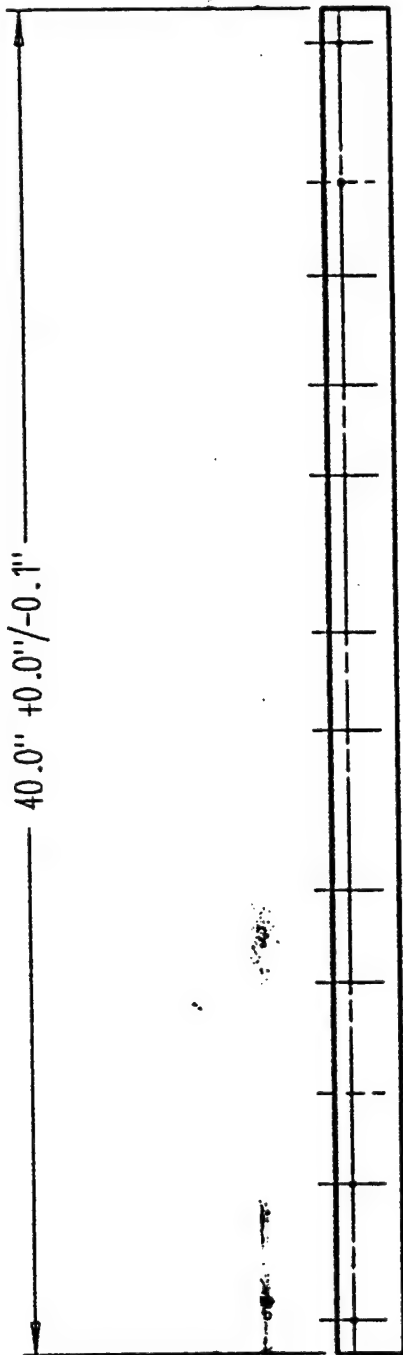
* $5/8''$ DIA HOLE
x $5/8''$ DEEP
6-PLCS

APPROX WT. PER PART= lbs

TOLERANCE: (UNLESS SPECIFIED) ALL DIMS $\pm 1/32''$ FRACTIONS $\pm 1/16''$		ALKEY INC KALONA	
FINISH: NONE		TITLE: CROSS BOARD - / MILITARY-4	
QTY: 2 per pallet		DATE: 5/96	
SCALE: 1:1		REV LET: -A-	
DIM L: 1-1/2" NOM X 3-1/2" X NOTED LG		DOC NO.: M1	

NOTES: (unless otherwise noted)
1) ALL DIM'S MARKED THUS "4" ARE TOLERANCED
AS NOTED, AND FIXED BY JIGS/TOOLING TO BE
REPEATED WITHIN $\pm 1/32''$

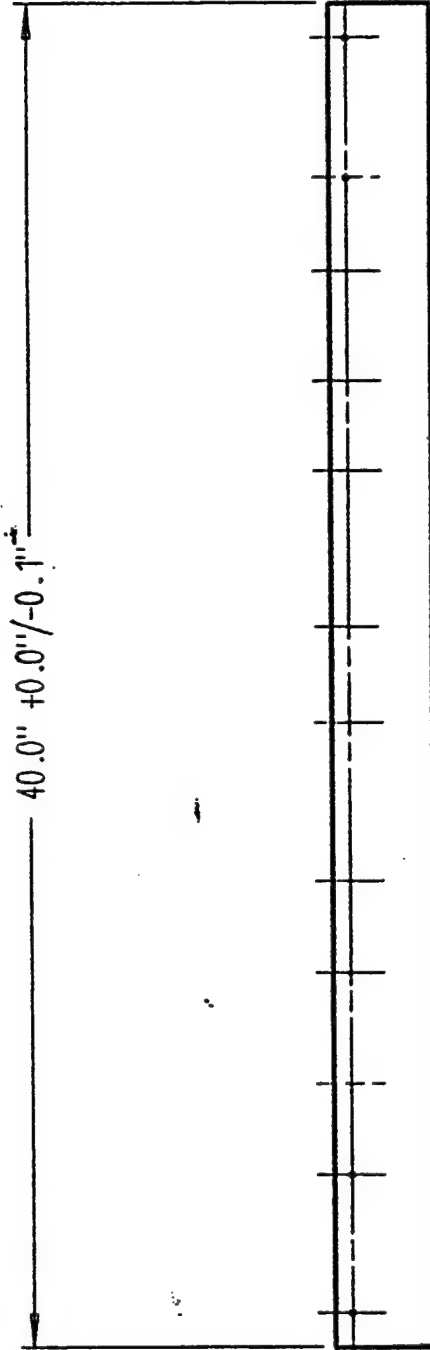
MP-24



APPROX WT. PER PART= lbs

<p>FINISH: NONE</p> <p>QTY: 3 per pallet</p>		<p>TOLERANCE: (UNLESS SPECIFIED)</p> <p>1.1X +/- 1/16"</p> <p>1.1X +/- 1/32"</p> <p>FRACT +/- 1/8"</p>	<p>ALUET</p>	<p>ALUET INDOE</p> <p>WALOW.</p> <p>TITLE: TOP STRAP - STAN / MILITARY-PAL</p>
<p>DATE: 5/96</p> <p>SCALE: 1" = 1"</p>		<p>BY: A. ROTONDI</p> <p>REV LET: 1</p>		<p>DWG NO.: MP-</p>

MP-25



APPROX WT. PER PART= lbs

ALKEY INDUSTRIES KALAMAZOO, MI		TITLE: TOP STRAP - SPECIAL / MILITARY-PALLET		DES NO.: MP-2	
ALKEY INDUSTRIES 		DATE: 5/96 BY: A. ROTOND SCALE: 1" = 1'-0"		REV: 1: -A-	
TOLERANCE: (UNLESS SPECIFIED) FRACTIONS: ± 1/16" ± 1/32" ± 1/64" DECIMALS: ± 0.005" ± 0.010" ± 0.020"		MAT'L: 3/8" NOM. X 3" WIDE X NOTED LG		FINISH: NONE	
QTY: 1 per pallet					

PART 8

APPENDIX

ALKET INDUSTRIES

HDPE LUMBER MATERIAL PROPERTIES

Mechanical Properties		
	Average	Std. Deviation
Specific Gravity	0.75	0.05
Modules of Rupture	3280psi	160psi
Modules of Elasticity	0.345 million psi	0.020 million psi
Compression Parallel to Grain	1880psi	125psi
Compression Perpendicular to Grain	740 psi	80psi
Shear Parallel to Grain	910psi	50psi
Tension Parallel to Grain	1340 psi	120 psi

Physical Properties

Coefficient of Thermal Expansion

3.4 x 10 in/in/°F

Density

44pcf to 50 pcf

Moisture Content

negligible

Shrinkage/Swelling due to moisture

negligible

MATERIAL DIMENSIONAL TOLERANCE

All plastic lumber shall be the rough cut dimensional size in accordance with lumber industry standards.

Maximum "Cup"

Face width	4"	6"	10"	12"
Tolerance	1/16"	1/8"	1/4"	3/8"

**PLASTIC MARINE TIMBER
12 INCHES BY 12 INCHES**

1. SCOPE

1.1 Scope. This specification covers a 12" by 12" plastic marine timber to be used for the construction of various marine related structures, including docks, piers, and camels.

2. APPLICABLE DOCUMENTS

2.1 Publications. The following documents form a part of this specification to the extent specified herein.

ASTM D792	-	Specific Gravity (Relative Density) and Density of Plastics by Displacement
ASTM D570	-	Water Absorption of Plastics
ASTM D746 (MODIFIED)	-	Brittleness Temperature of Plastic and Elastomers by Impact
ASTM D790	-	Flexural Properties of Plastics
ASTM D2240	-	Rubber Property-Durometer Hardness
ASTM D4329	-	Operating Light and Water Exposure Apparatus (Fluorescent U.V. Condensation Type) for Exposure of Plastics (UVA-340)
ASTM D4060	-	Abrasion Resistance of Organic Coatings by the Taber Abraser
ASTM D543	-	Resistance of Plastics to Chemical Reagents
ASTM D638	-	Tensile Properties of Plastics
ASTM E12	-	Density and Specific Gravity of Solids, Liquids and Gases
ASTM D695	-	Compressive Properties of Rigid Plastics
ASTM F489	-	Static Coefficient of Friction
ASTM D1761	-	Method of Testing Mechanical Fasteners in Wood (Section 102)
EPA SW846 (Modified)	-	Toxic Characteristic Leaching Procedure